NASA-CR-172,412*

NASA Contractor Report 172412

NASA-CR-172412
19840023393

HOOP/COLUMN ANTENNA
RF VERIFICATION MODEL
VOLUME I: TEST RESULTS

W. F. Croswell (Editor), M. D. Vanstrum,
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HARRIS CORPORATION
Melbourne, Florida

Contract NAS1-15763
August 1984

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Hampton, Virginia 23665

HOOP/COLUMN ANTENNA
RF VERIFICATION MODEL
ANALYSIS AND TEST

BY

HARRIS CORPORATION
GOVERNMENT ELECTRONIC SYSTEMS DIVISION

PREPARED FOR: LANGLEY RESEARCH CENTER
UNDER CONTRACT NAS1-15763

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N84-31463*

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NOTE:

ANALYSIS AND CORRELATION DATA FOR HOOP/COLUMN ANTENNA RF VERIFICATION MODEL FINAL REPORT COMPRISE VOLUME II.

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HOOP/COLUMN ANTENNA RF VERIFICATION MODEL ANALYSIS AND TEST

INTRODUCTION

The purpose of this report is to present the results of an experimental and theoretical study of the RF characteristics of the Hoop/Column quad aperture antenna. The primary purposes of the RF Verification Model in the LSST Program were twofold.

1) To provide experimental pattern data for the quad aperture configuration at different reflector edge illumination levels from which the geometry and edge effects can be assessed. Also, to provide experimental data which can be compared with calculations using various theoretical reflector scattering formulations.

2) To experimentally determine the effects of scale model quartz cables, to be used in the hoop column design, upon secondary patterns in order to assess the importance of developing a scattering theory to predict such effects.

In addition to the description of experimental procedures and the presentation of extensive experimental results, a comprehensive theoretical study of how to feed the quad aperture configuration is described. Firstly, an outline of the physical optics formulation used for subsequent calculations is given. Secondly, the experimental feed horns were modeled, using a Huygen's source approximation. From these feed horn patterns, calculations for various experimental aperture configurations were made, and compared with experimental patterns. Using these data and measured raster scan contour plots, a fundamental effect of parasitic side lobes is discussed, including location in space, and reasons for the approximate amplitude.

Based upon these results, a comprehensive theoretical study was conducted in order to design a feed for use in the quad aperture configuration resulting in good pattern characteristics. The first feed studied was the corrugated horn, where contiguous cross track coverage suitable for a radiometric mission was considered. Next, the effect of feed aperture distributions upon the secondary gain and pattern characteristics was determined for a wide variety of typical low side lobe aperture distributions. Then, related to communications missions, a brief study was made of multimode horn feeds suitable for clusters. Finally, a discussion of feed designs suitable for the quad aperture is given, along with a brief summary of conclusions from the study.

DESCRIPTION OF TEST ARTICLES AND ALIGNMENT

A top-view drawing of the basic pie-shaped reflectors, support fixtures, and feed support plates are given in Figure 1. Notice that the center of rotation is located behind the vertex of the parabolas in order to balance the overall structure on the azimuth-elevation antenna mount. Front and side views of the structure are given in Figures 2, 3, and 4 where scale model quartz cables are shown attached to the antenna. It can be noted from these figures that the feed support and fixtures are located well below the primary apertures; the feed horn itself provides the only blockage area. Detailed sketches showing specific dimensions and angles are given in Figures 16 through 19. (See Volume II)

The reflectors, as shown in Figure 5, were fabricated on a mold with an accuracy of 0.002 inch. The surface was made conductive with a flame spray aluminum process. The final reflectors were checked on the backup structure with a swept template and shown to be accurate to within 0.008 inch rms.

The reflector and feed support assembly were hoisted in sections as shown in Figure 6 and assembled on the pedestal. A special alignment tool was

manufactured to check feed alignment. Three known points located by holes were placed in each sector during manufacture. With these holes and an alignment fixture the distance to the feed on focus can be set to an accuracy of 0.03 inch. By placing fine cross hairs in the feed horn aperture, and the input waveguide to the feed horn, angular alignment was obtained. The exact offset angle of 21.6 degrees was marked on the reflector surface. The feed horn alignment was determined by observing the input waveguide, with the mixer removed.

The transmitting antenna, and an alignment scope, are shown in Figure 8. The transmitting antenna, which is located at the top of the tower, was aligned by the double cross hair method used on the feed horn. This alignment permitted bore sighting within a distance of ±1.0 foot of the center axis of the two sectors as observed from the transmitting tower. The bore sight scope, as shown in Figure 8, permits the setting of the test antenna axis with errors of less than 0.004 degrees.

The quartz wires were mounted as required during the test program, using the fiberglass support fixture on the feed support structure, and special tabs attached around the edge of the dish, as shown in Figures 9 and 10. Also visible in Figure 10 are the standard gain horn, mounted on the feed support structure, and the white parabolic reflector used to obtain the phase reference for the two channel phase lock receiver.

DESCRIPTION OF THE TEST RANGE AND EQUIPMENT

The antenna test range equipment is illustrated in Figure 11. Most of the equipment is standard Scientific Atlanta and Hewlett Packard off-the-shelf instrumentation. Using analog-to-digital devices, the output of the synchros was digitized and recorded on floppy disks along with phase-amplitude data using a Vector computer. The data on the floppy disks were then transferred

off-line to the Harris H-80 and H-800 computers and stored. All of the subsequent raster scan data shown in this report were obtained in this manner. The basic pedestal gear and synchro accuracy was checked; hence the recorded data from the synchros can be repeated by rotating the pedestal in the same direction for each line of the raster scan run. The absolute accuracy of any angular number recorded was better than 0.05 degrees. It was noted that the stability of the amplitude recording system was better than 0.1 dB from day to day, as was the drift during any one 8 hour measurement day.

The geometrical arrangement of the antenna range, along with a conservative link budget, is given in Figure 12. It was noted during the course of measurement that receiver noise began to be noticeable about 70 dB down in dynamic range, although repeatable lobes were measured at lower values. The multipath signal levels for the test antenna were determined using the geometry of Figure 12, and the measured transmitting antenna pattern given in Figures 13 and 14. The cross-polarization levels from the transmitter were generally below -40 dB in the multipath reflection Fresnel zone. The direct polarization pattern level in the same region will be -26 dB to -30 dB down. The above mentioned measurements, along with the multipath zone being 13 to 16 degrees away from any measurement elevation angle, indicate that the multipath had minimal effect upon the detailed measurements reported.

DESCRIPTION OF EXPERIMENT AND CALIBRATION

The receiving feed antennas were specified to have -6 dB and -14 dB edge tapers at the bisector of a pie reflector. The feed horns designed for use in this experiment are depicted in Figure 15. A detailed set of primary patterns were measured and recorded in both analog and digital form, as listed in the pattern log, LSST-I, page 24. The analog patterns are shown on the pages as

listed in LSST-I. The feed horns were set at an angle of 21.6 degrees corresponding to bisector of the angle between the focal point and the outer edge of the pie sector. For convenience, the following are the summary parameters used in this experiment:

FOCAL LENGTH	137.7 inches
OFFSET ANGLE	21.6 degrees
RADIUS OF PIE SECTOR	110.8 inches
DIAMETER FROM FOCUS TO PIE EDGE	105.3 inches
OPERATING FREQUENCY	15.0 GHz
PHASE CENTER DISTANCE BEHIND HORN APERTURE	
-6 dB	0.30 inches
-14 dB	0.99 inches

The antenna range was chosen to minimize multipath signals. The distance between the towers was approximately D^2/λ or about one-half the conventional range distance. In order to correct for quadratic phase error, due to a foreshortened range, the feed was displaced along the offset angle. Several calculations were run for symmetrical offset reflectors and compared with measurements where the axial feed displacement was varied. From these data, and gain measurements, it was determined that an axial defocus (movement along the offset angle of 21.6 degrees) of about 1.2 inches gave optimum gain. All of the data taken are given in the log, LSST-II, page 31, with the subsequent pages of patterns listed for indexing.

It should be noted that great care was taken to ensure calibration between pattern sets that were taken over a period of nearly five weeks. As a routine procedure, the pedestal was always rotated in the same direction during pattern taking. This tended to maintain gear wear errors in the same direction. Also, the systems were left on continuously to minimize warmup

errors, and there was a gain measurement taken by the substitution method before and after each measurement sequence. The only significant measurement error noted was the resetting of synchros to precise increments. This error, on an absolute basis, was less than 0.05 degree and was observable for only a few significant pattern locations. It was noticeable as an amplitude change on secondary peaks at wide angles. There was little chance of improving on the accuracy without a complete redesign and rebuild of the pedestal and synchro system.

Data were also taken for both no scan and scanned cases. For the scan cases the horn was mounted in a plane perpendicular to the offset angle of 21.6 degrees. The horns were scanned in the horizontal plane and toward the direction of the other pie sector. Data are presented in a three-dimensional azimuth-elevation-amplitude plot, followed by an azimuth-amplitude plot, and an elevation-amplitude plot for detailed review. The data presented allow for a detailed comparison of the aperture coupling problem between two pie-shaped sectors.

SUMMARY OF ANALOG PATTERN MEASUREMENTS

The purpose of presenting these results is to give an expanded pattern description of the aperture coupling and quartz wire effects over wide angular sectors. It should be noted that the quartz wires produced few noticable pattern changes, and hence no detailed raster scans were obtained. The secondary pattern log is given in LSST-IV through LSST-IX, pages 119-306. In order to compare one pattern set with another in absolute amplitude, the measured gain for that pattern set is available in the recorded floppy disk data.

HARDWARE DESCRIPTION AND ANALOG PATTERNS LOGS

The remainder of Volume I consists of photographs, hardware descriptions, and antenna patterns.

Figure 1. TOP VIEW OF THE RF VERIFICATION MODEL

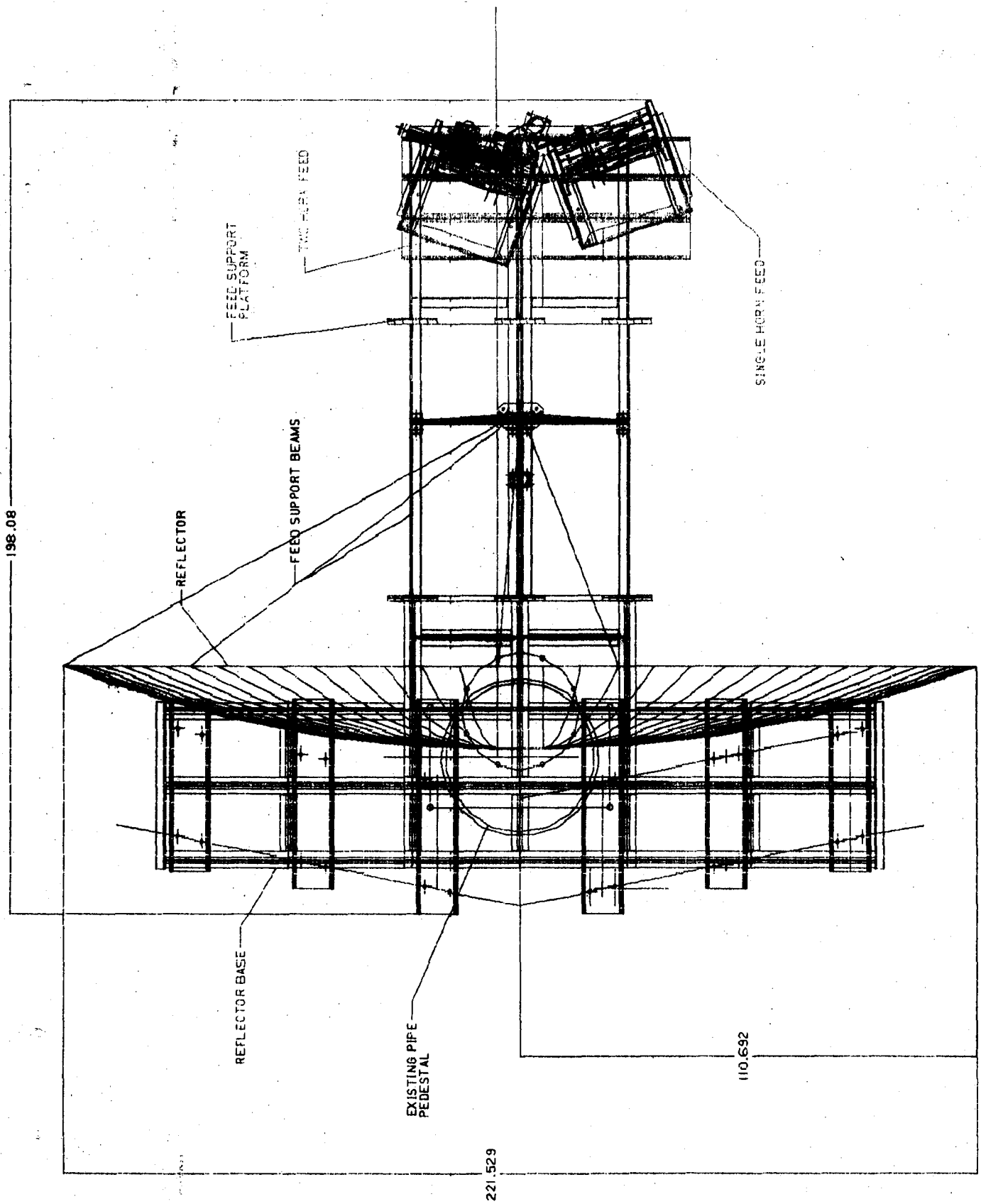


Figure 2. FRONT VIEW OF THE RF VERIFICATION MODEL

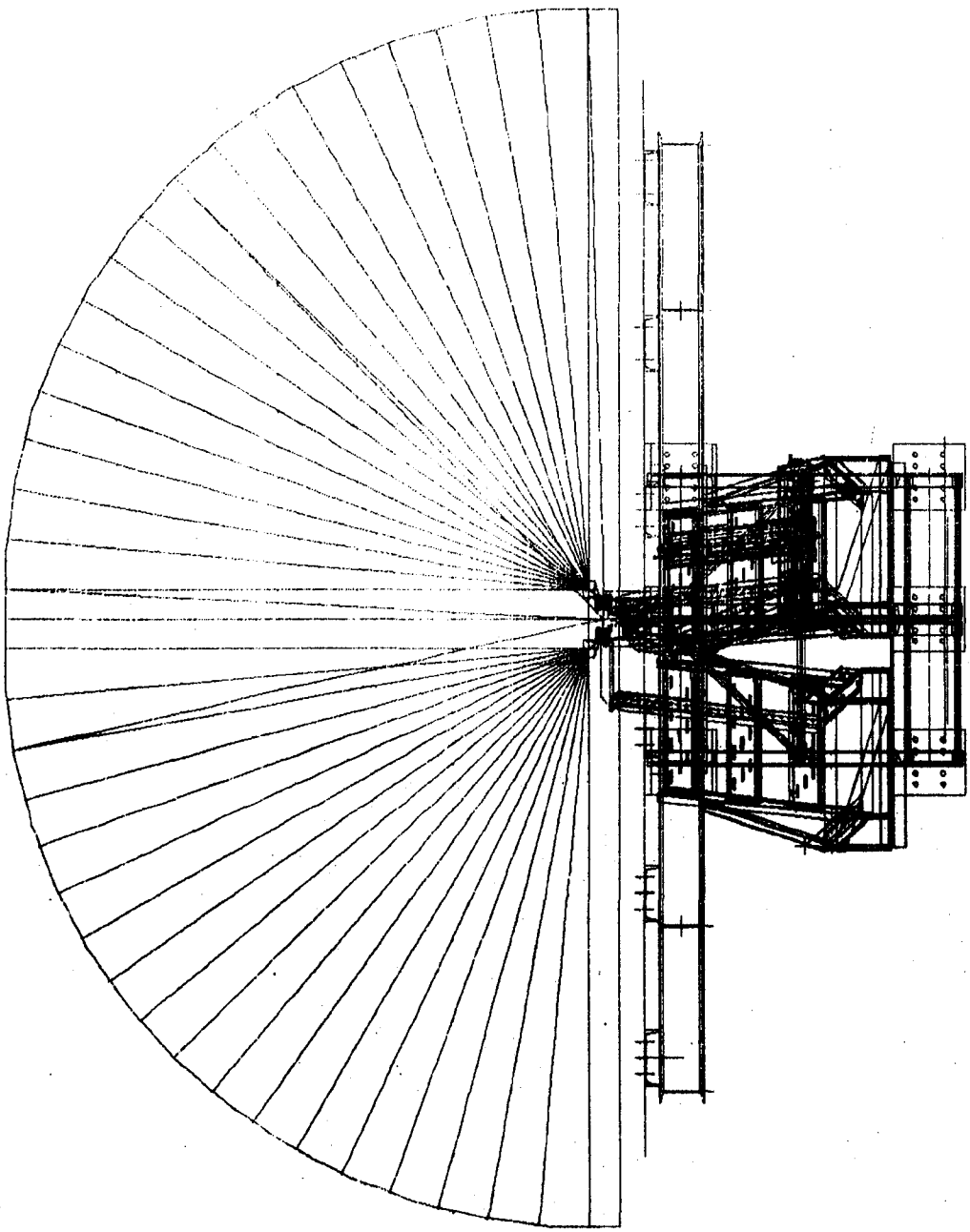


Figure 3. SIDE VIEW OF THE RF VERIFICATION MODEL

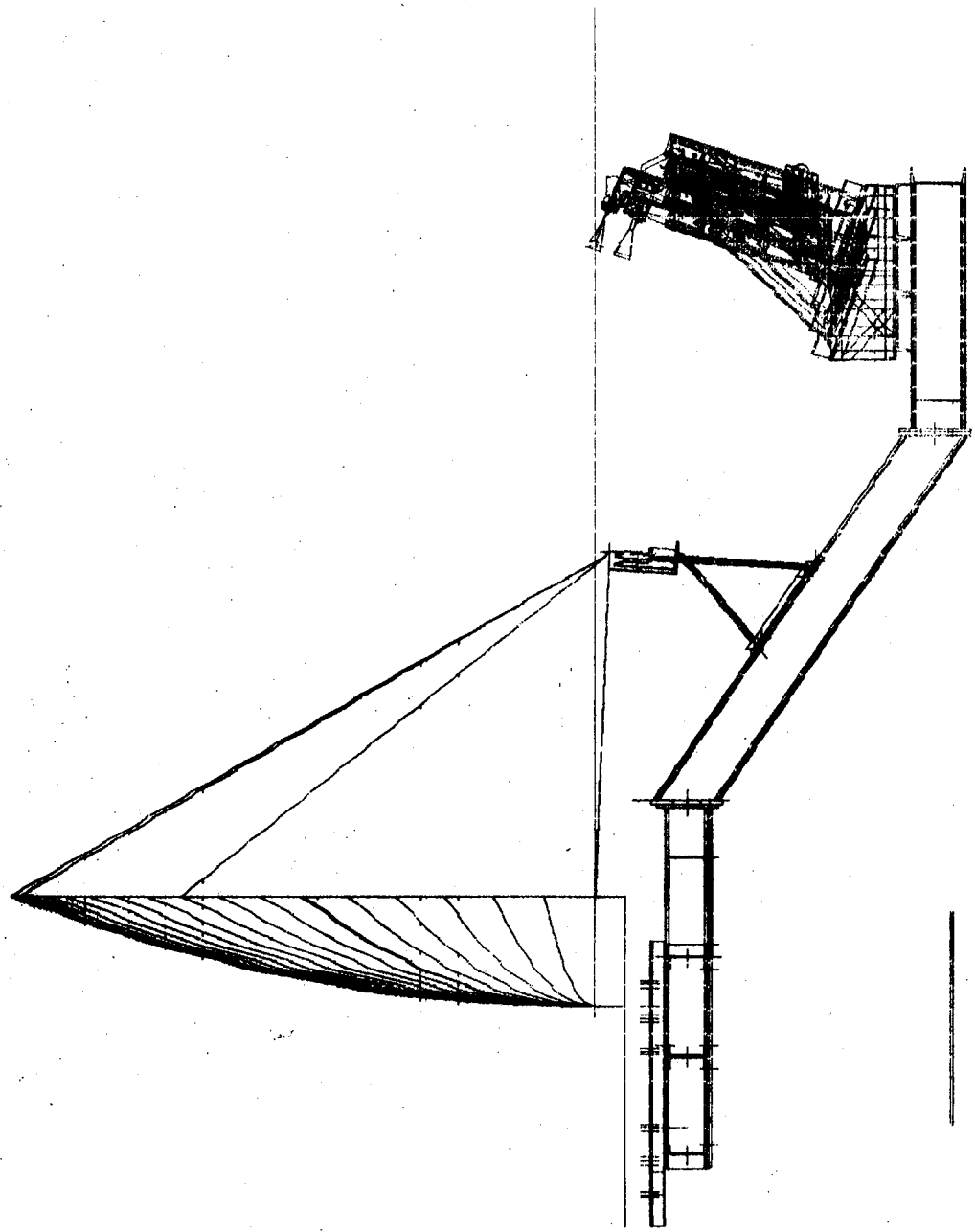
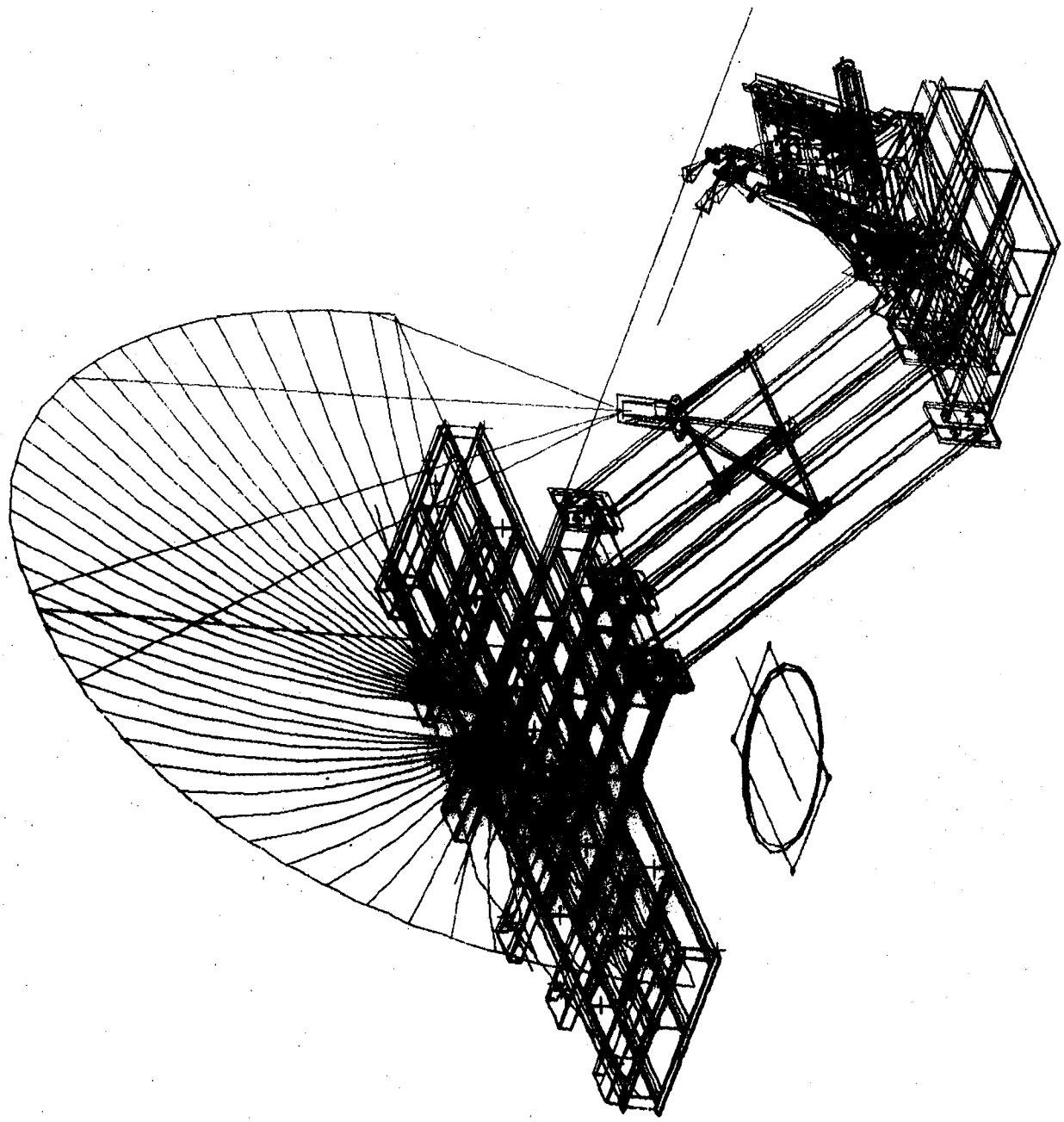


Figure 4. ISOMETRIC VIEW OF THE RF VERIFICATION MODEL



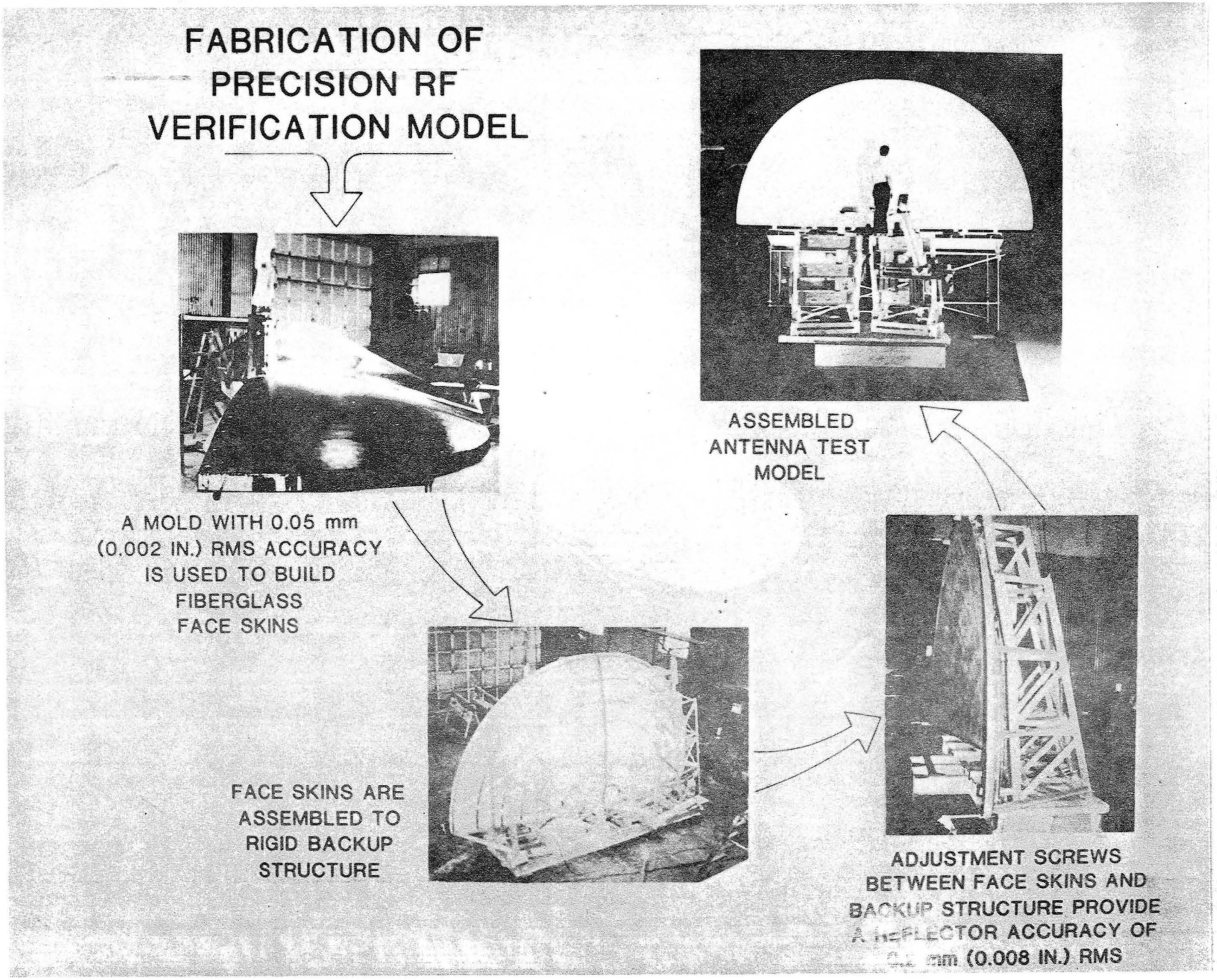


Figure 5. PHOTOGRAPH OF THE REFLECTOR AND BACKUP STRUCTURE AND ASSEMBLY DURING FABRICATION

Figure 6. PHOTOGRAPH OF THE REFLECTOR STRUCTURE BEING LIFTED ON THE ANTENNA RANGE

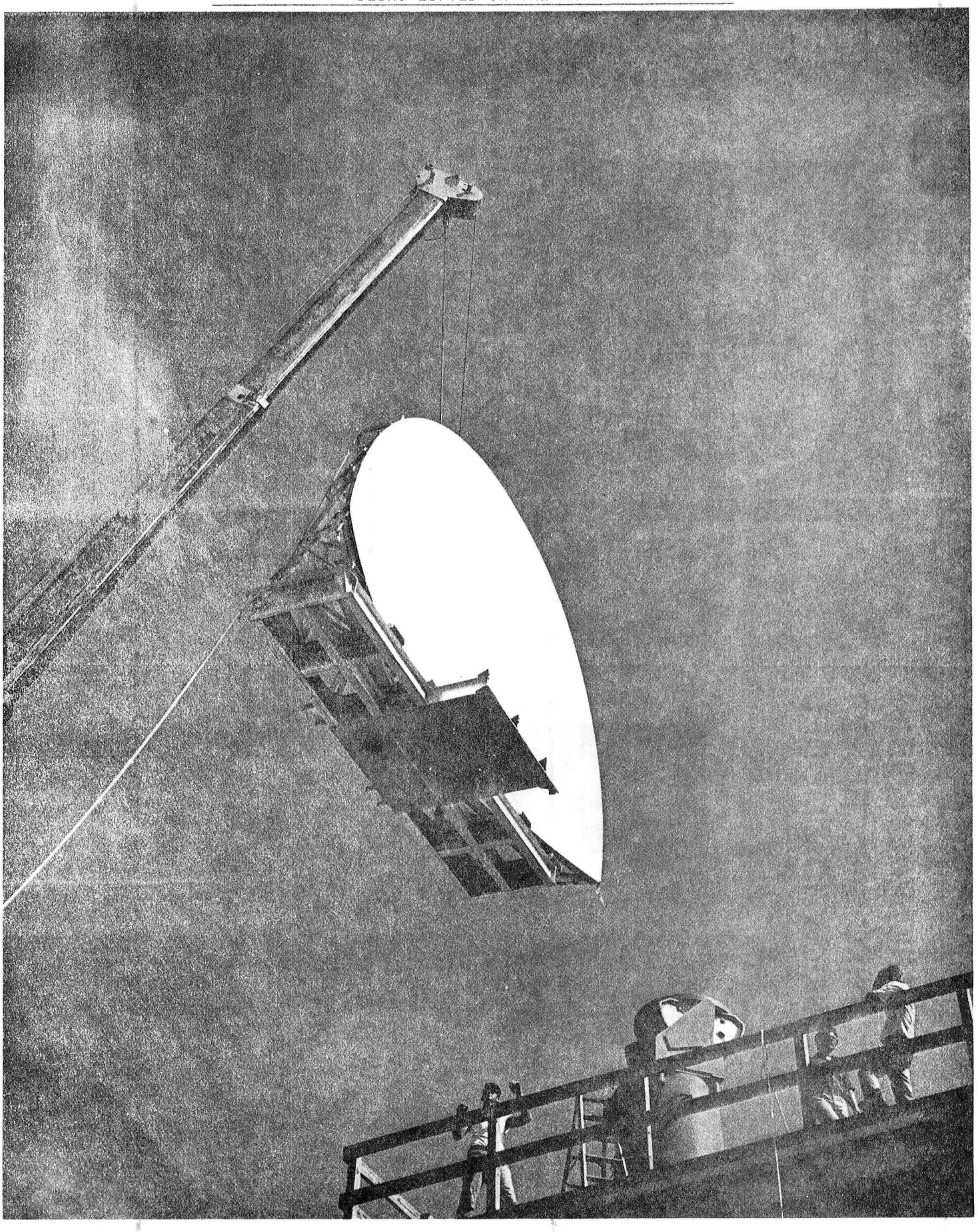


Figure 7. PHOTOGRAPH OF FEED ALIGNMENT STRUCTURE BEING USED ON ANTENNA RANGE

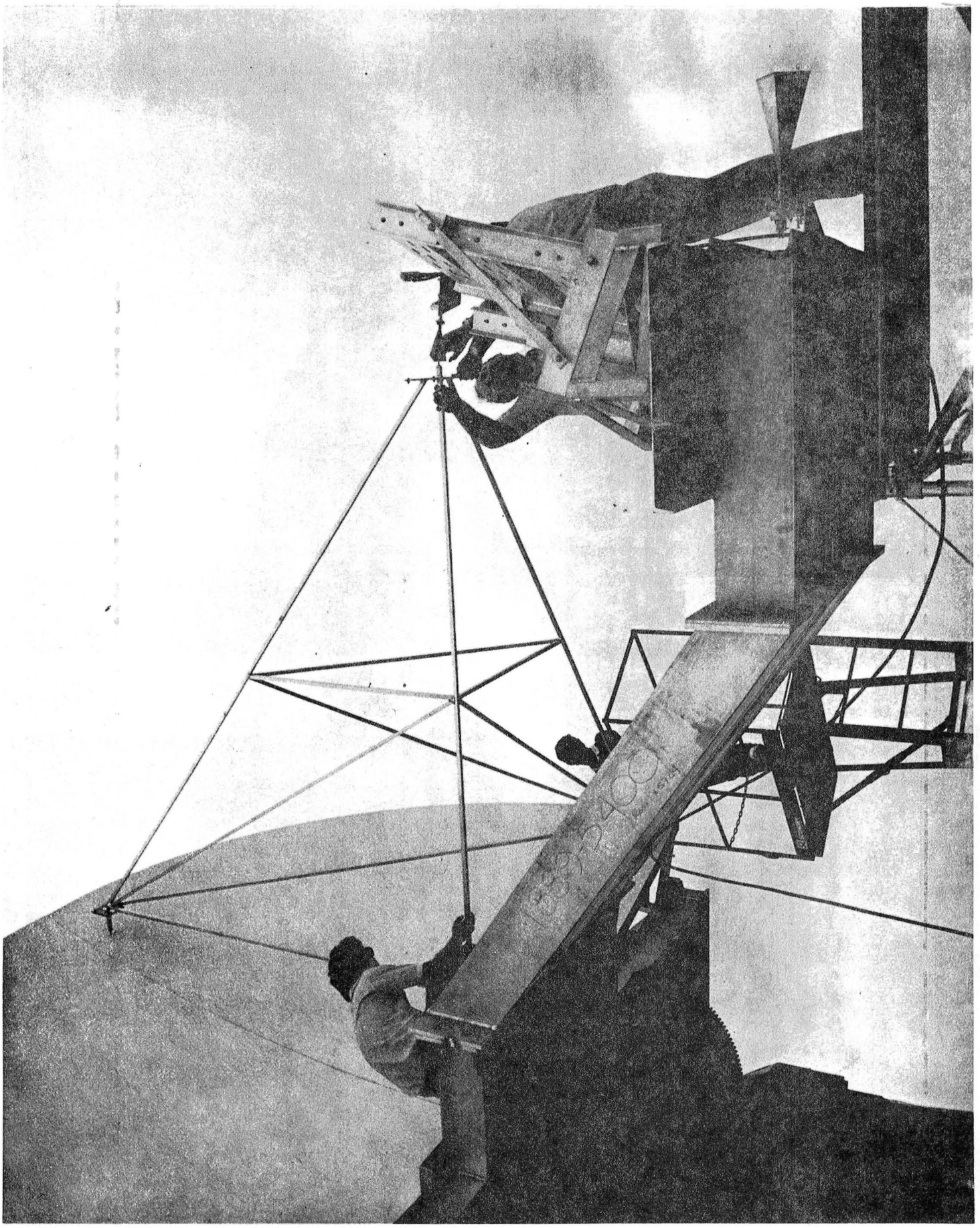


Figure 8. PHOTOGRAPH OF RF VERIFICATION MODEL LOCATED ON ANTENNA RANGE SHOWING THE ALIGNMENT SCOPE AND TRANSMITTING ANTENNA AND TOWER

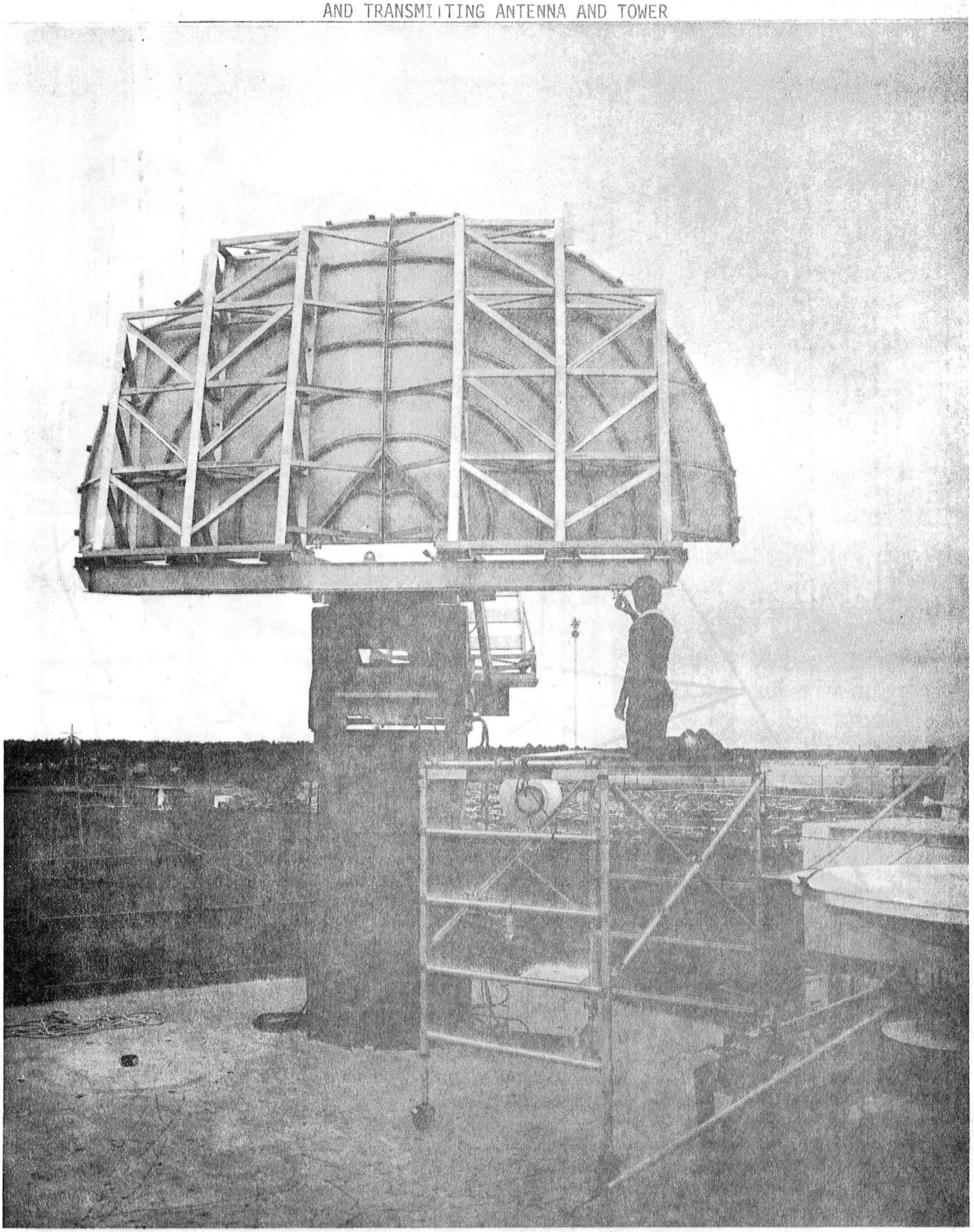


Figure 9. RF VERIFICATION MODEL SHOWING QUARTZ CORDS, FRONT VIEW

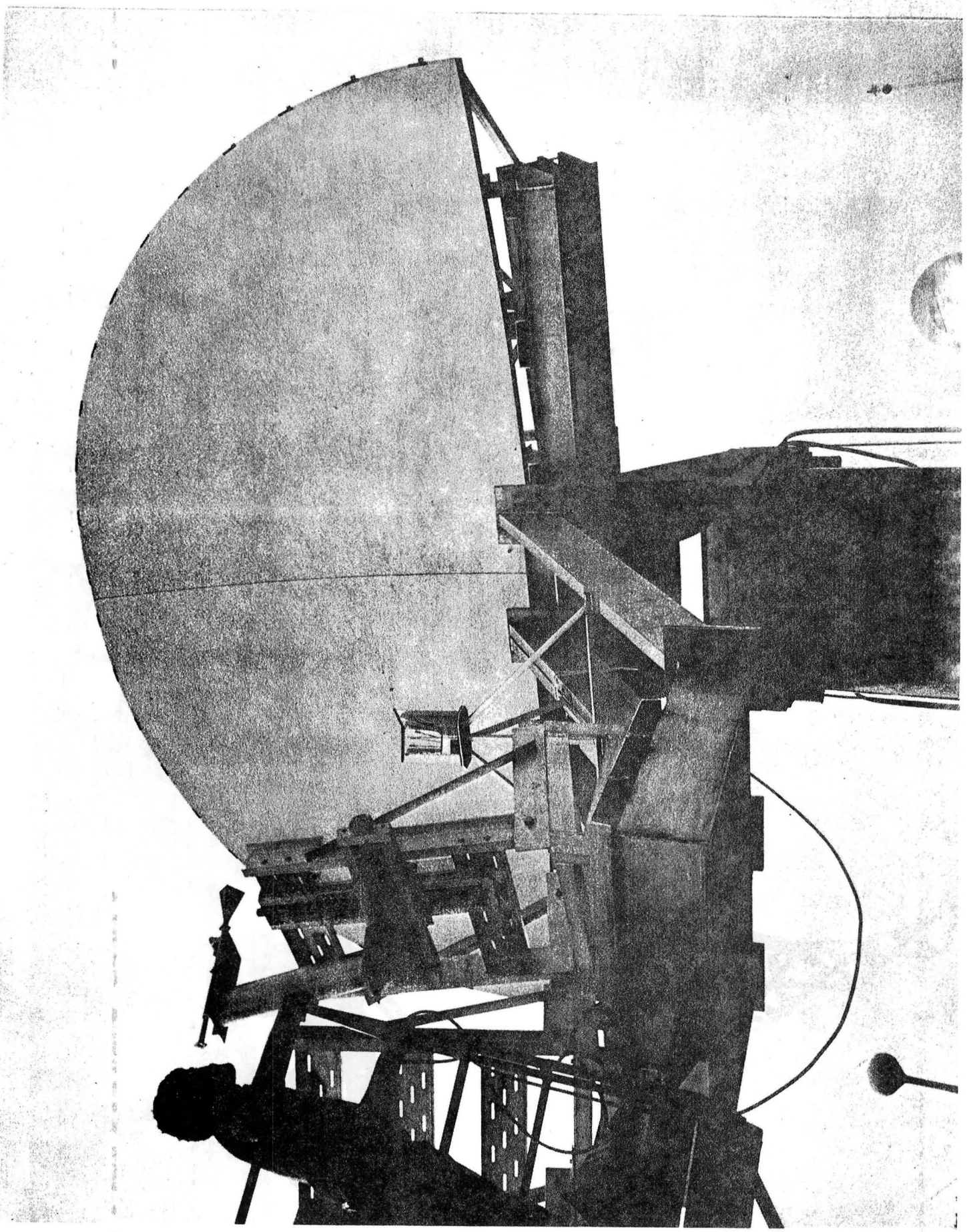
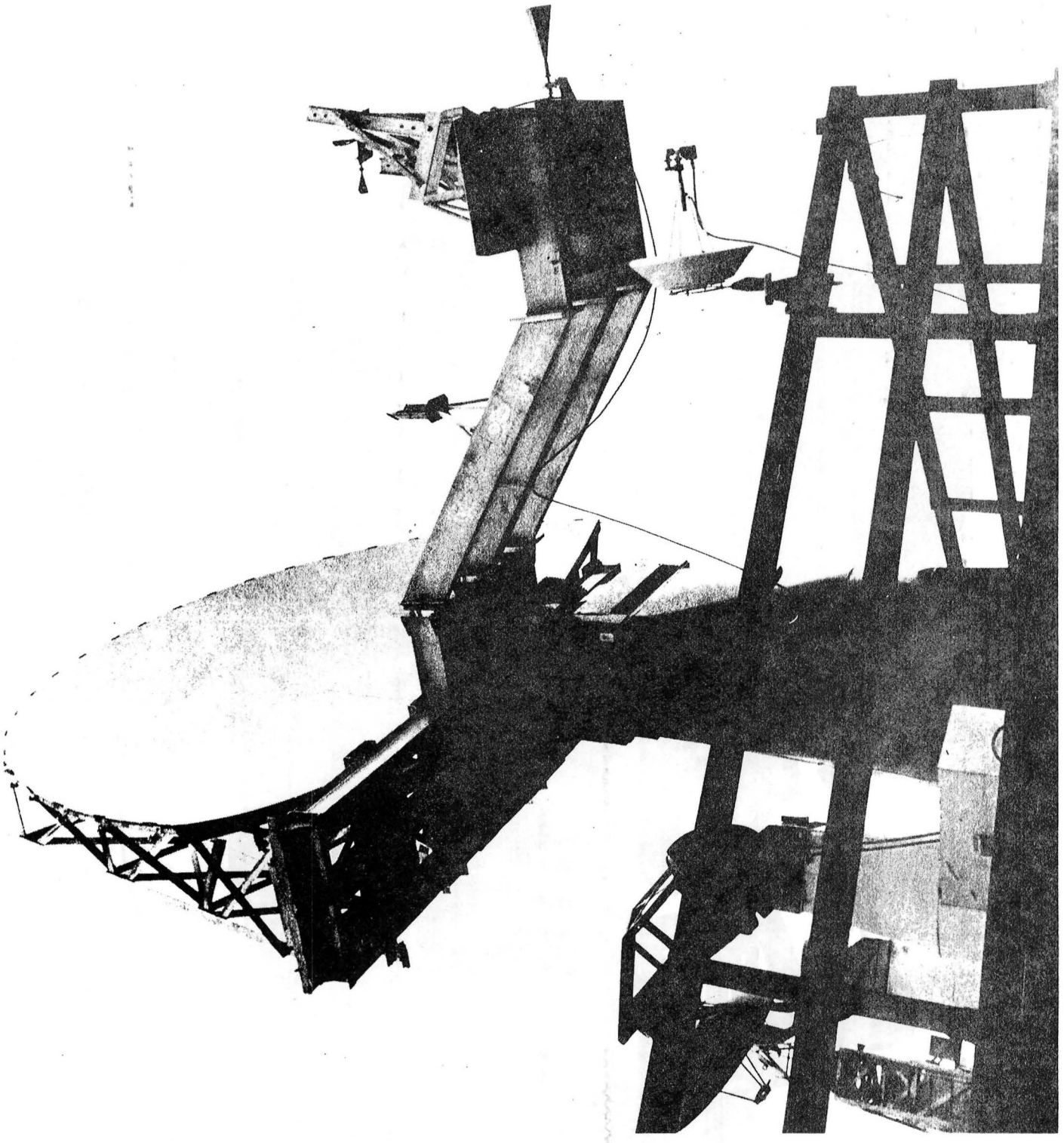
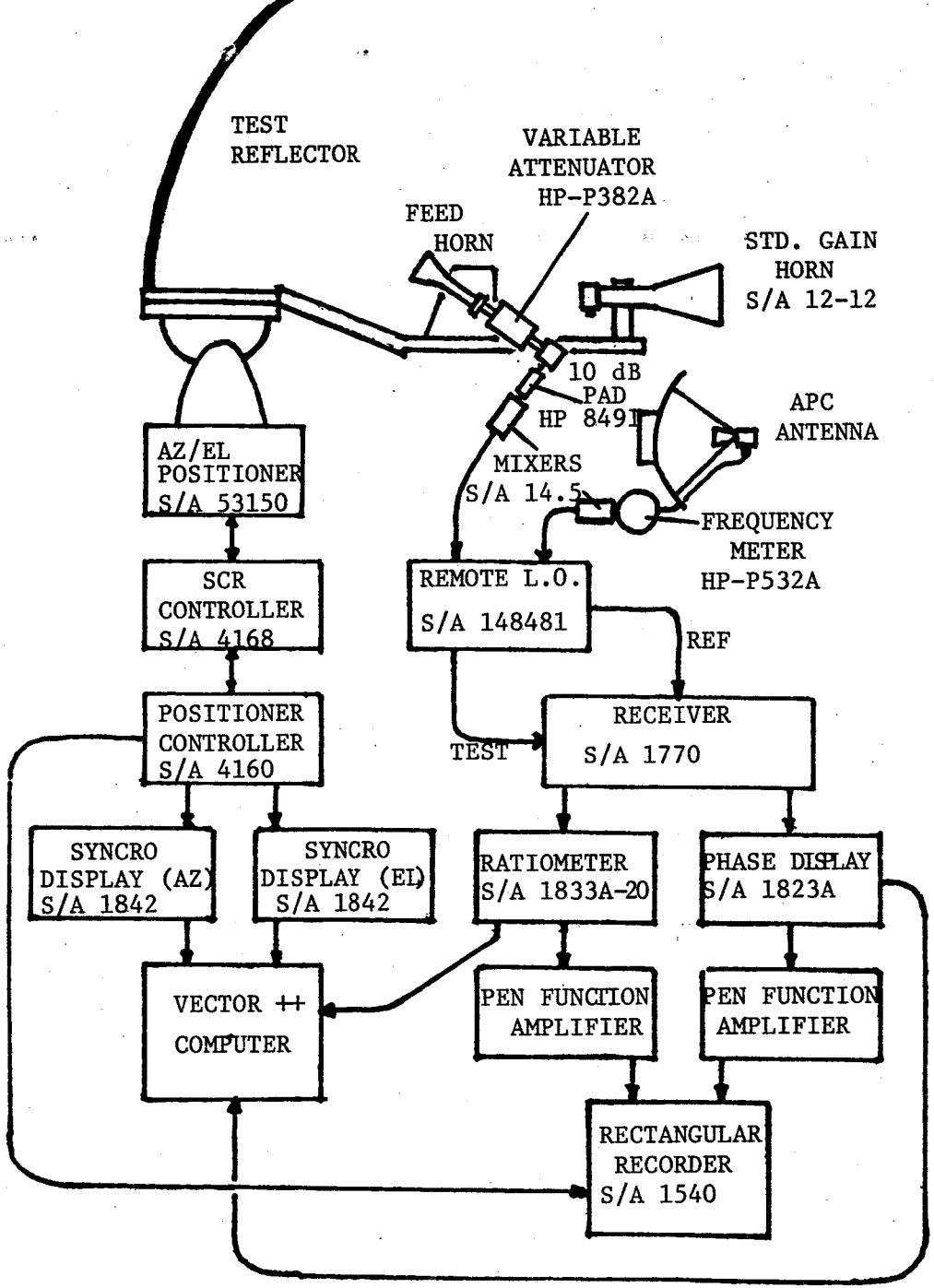


Figure 10. RF VERIFICATION MODEL SHOWING QUARTZ CORDS, SIDE VIEW





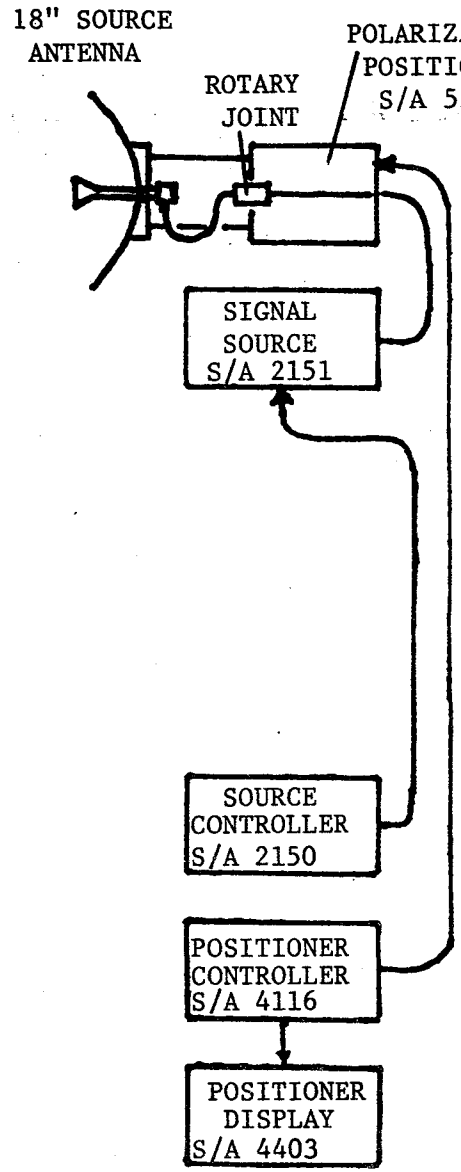
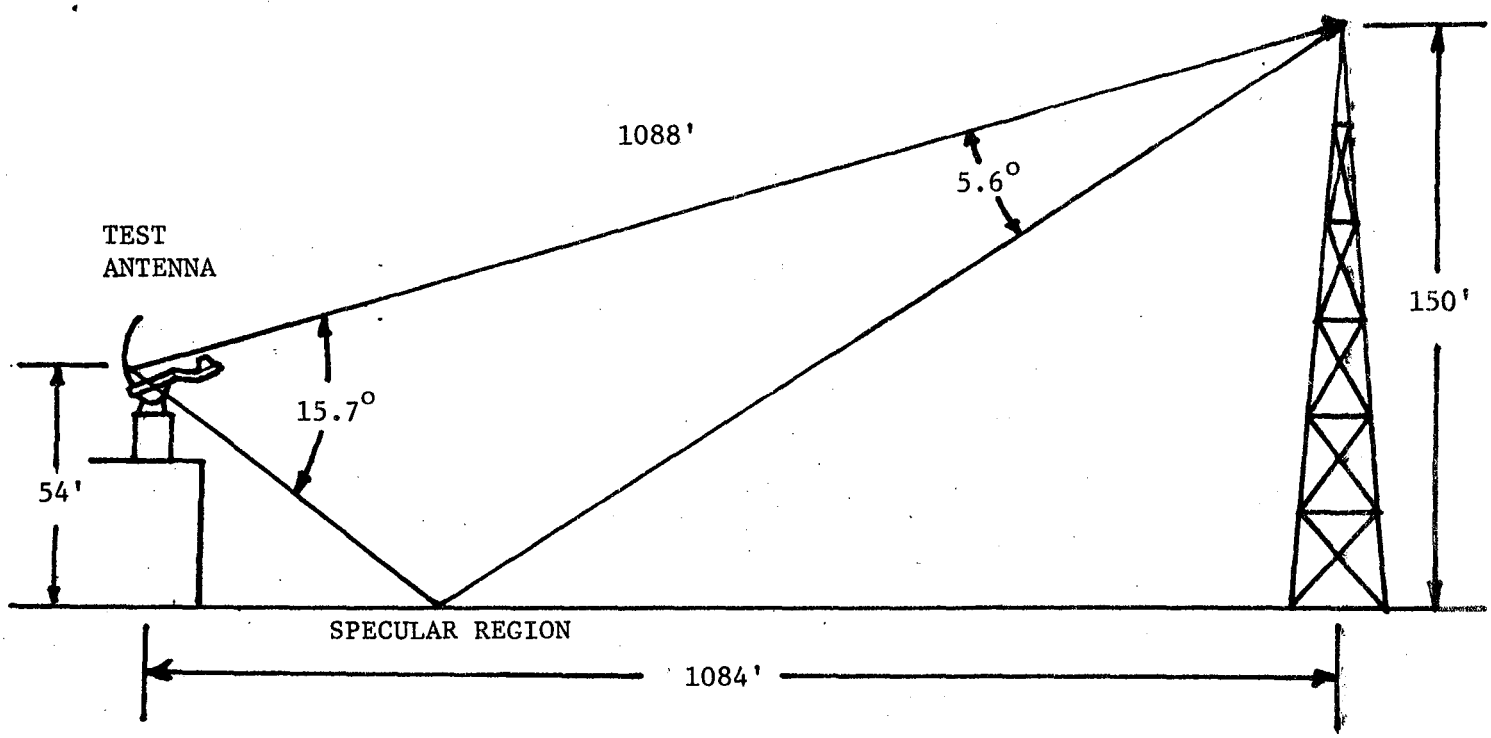


FIGURE 11. ANTENNA RANGE EQUIPMENT DIAGRAM



RANGE LINK BUDGET

SIGNAL SOURCE	+	8.0 dBm.
.141 COAX CABLE	-	5.0 dB.
SOURCE ANTENNA	+	31.0 dB.
RANGE LOSS	-	106.0 dB.
APC ANTENNA	+	33.0 dB.
RECEIVED POWER	-	39.0 dBm.
RECEIVER SENSITIVITY	-	50.0 dBm.
MARGIN	+	11.0 dB.
RECEIVED POWER	-	22.0 dBm.
RECEIVER SENSITIVITY	-	90.0 dBm.
DYNAMIC RANGE		68.0 dB.

REFERENCE CHANNEL

TEST CHANNEL

FIGURE 12. RANGE GEOMETRY and LINK CALCULATIONS

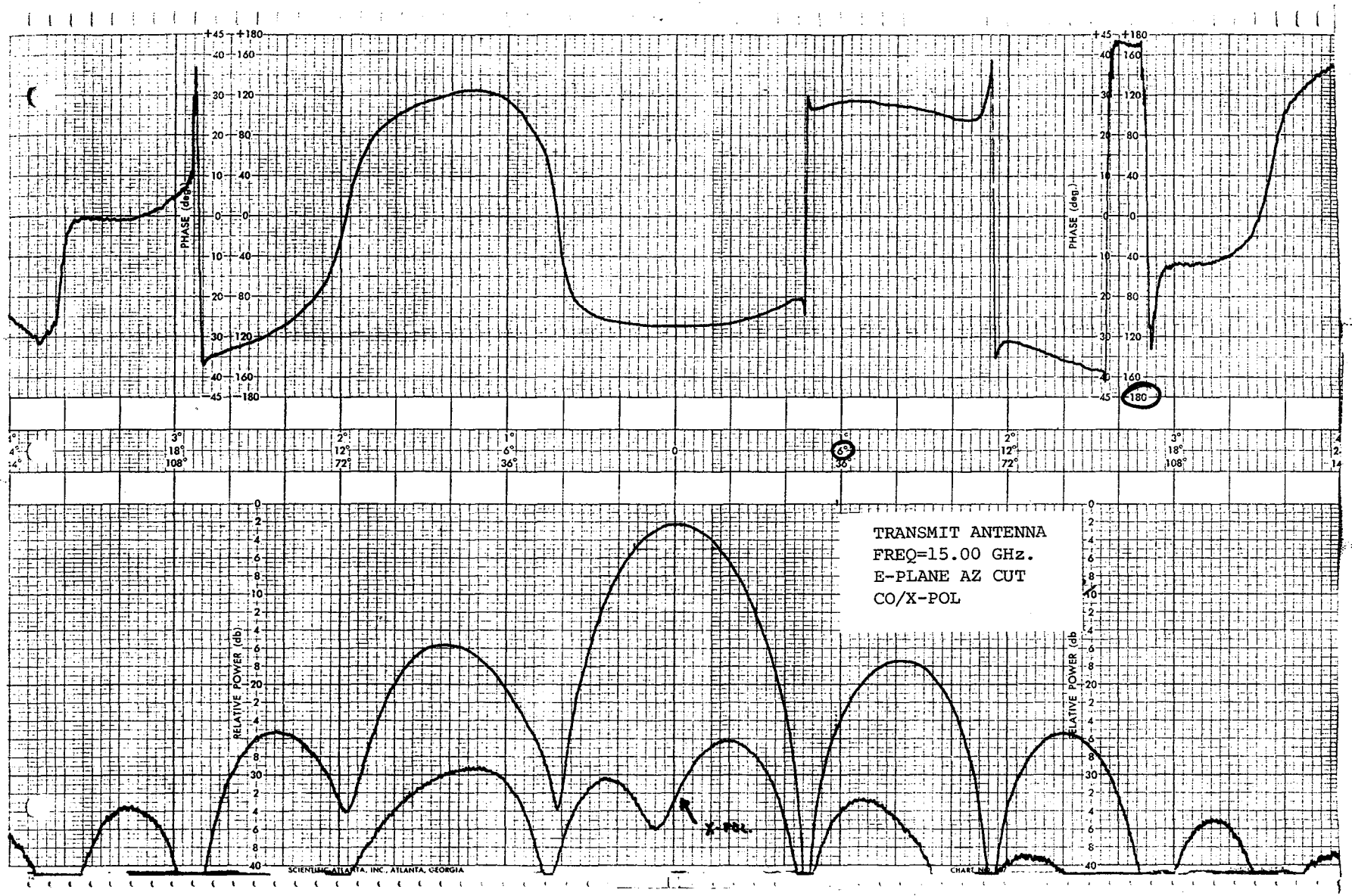


Figure 13. TRANSMIT ANTENNA PATTERNS, E PLANE-AZIMUTH CUT.

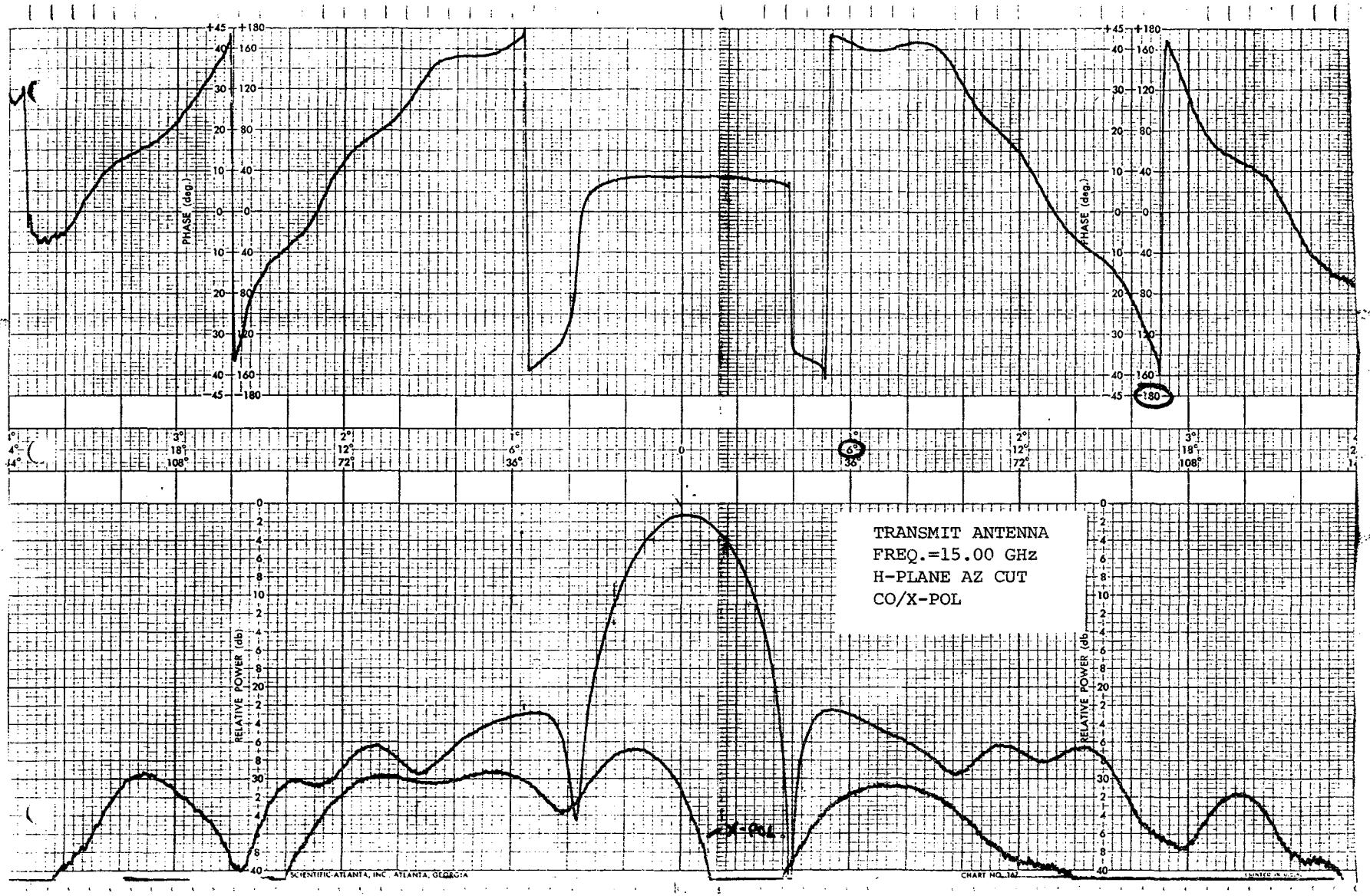
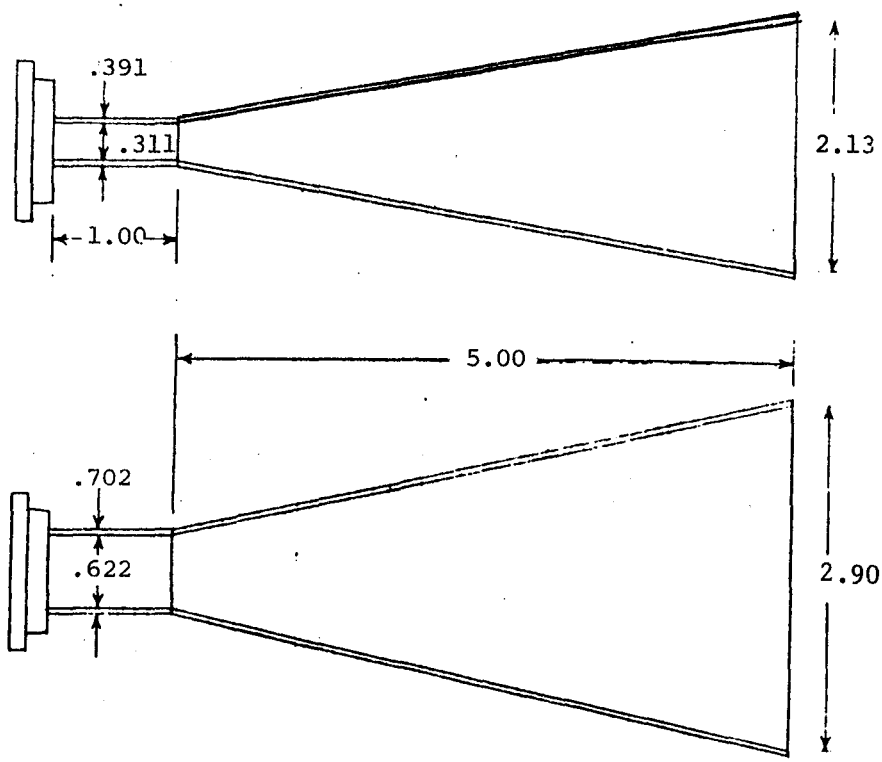
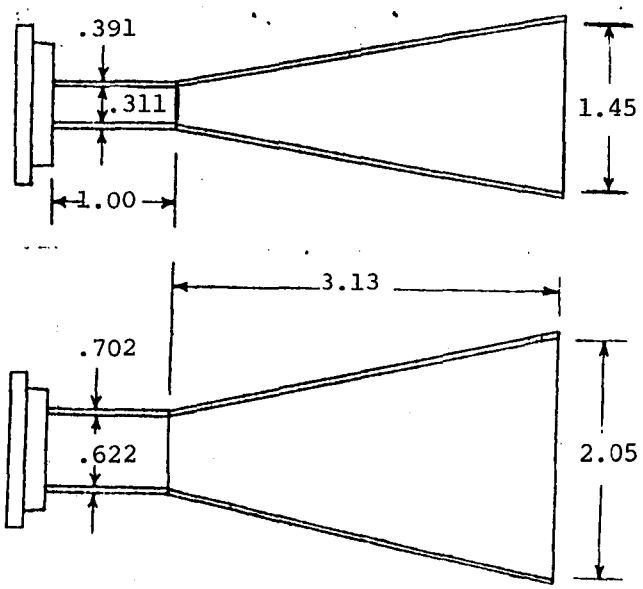


Figure 14. TRANSMIT ANTENNA PATTERNS, H PLANE AZIMUTH CUT.

A) LARGE HORN
14dB TAPER





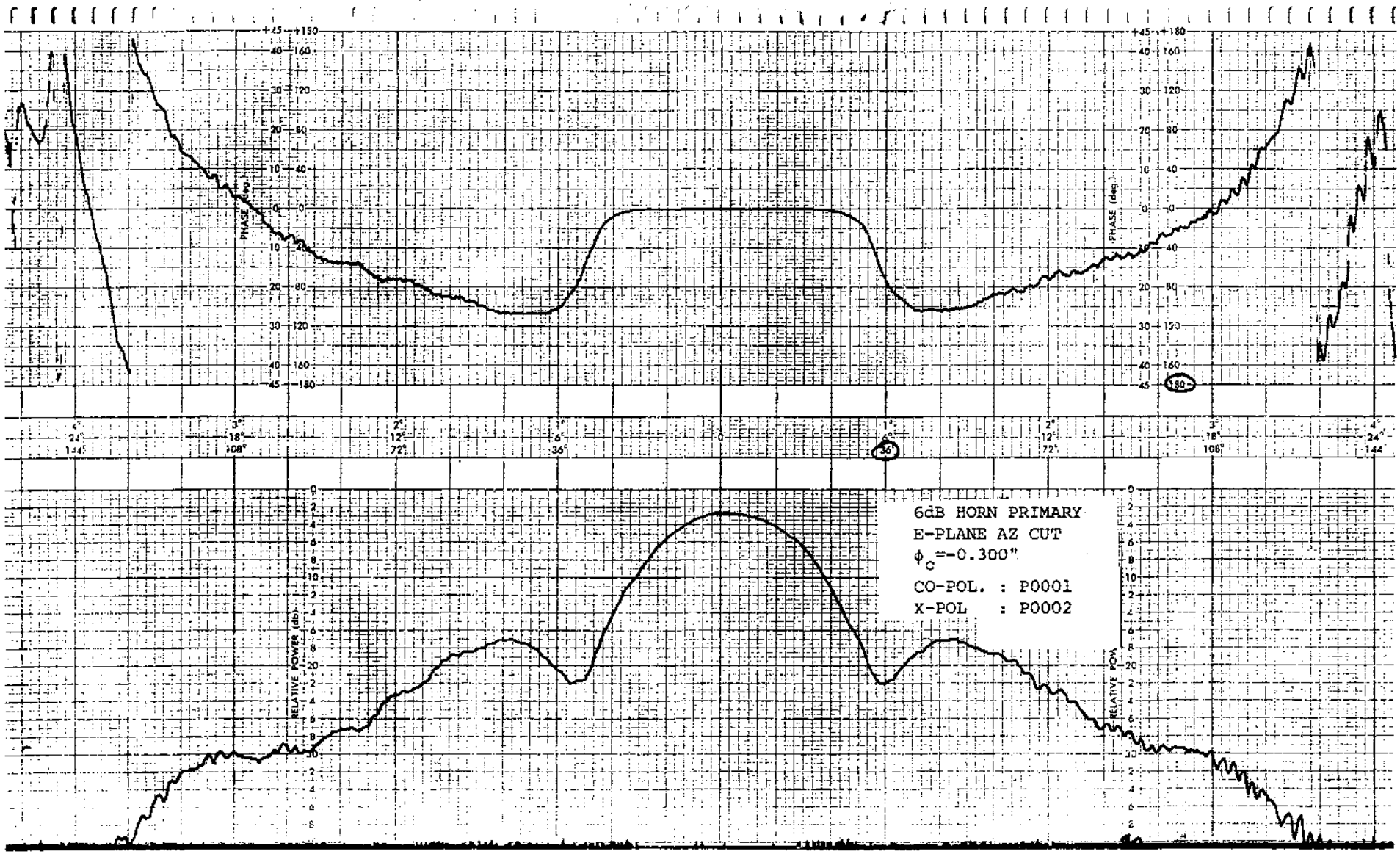
B) SMALL HORN
6dB TAPER

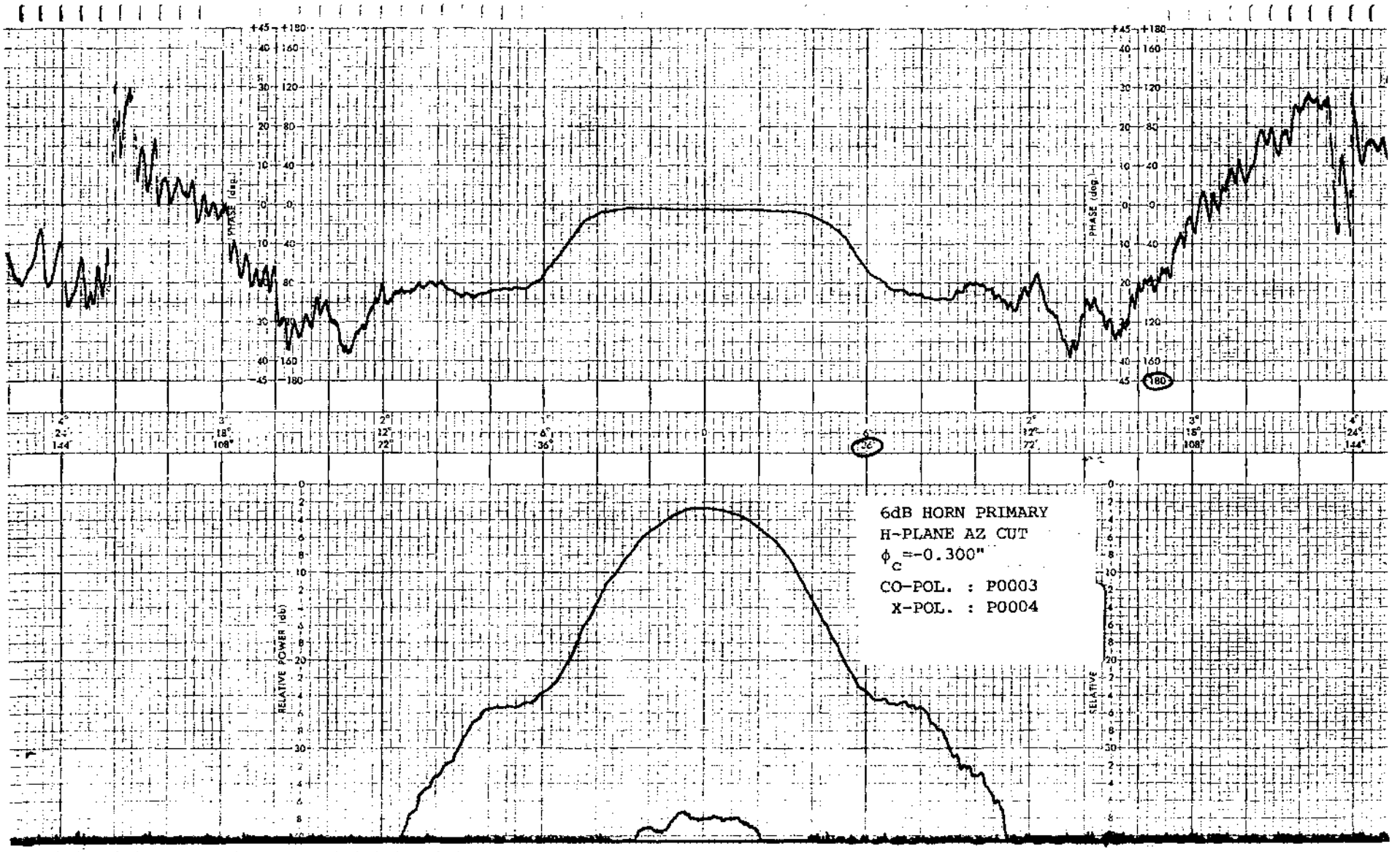
FIGURE 15. FEED HORNS

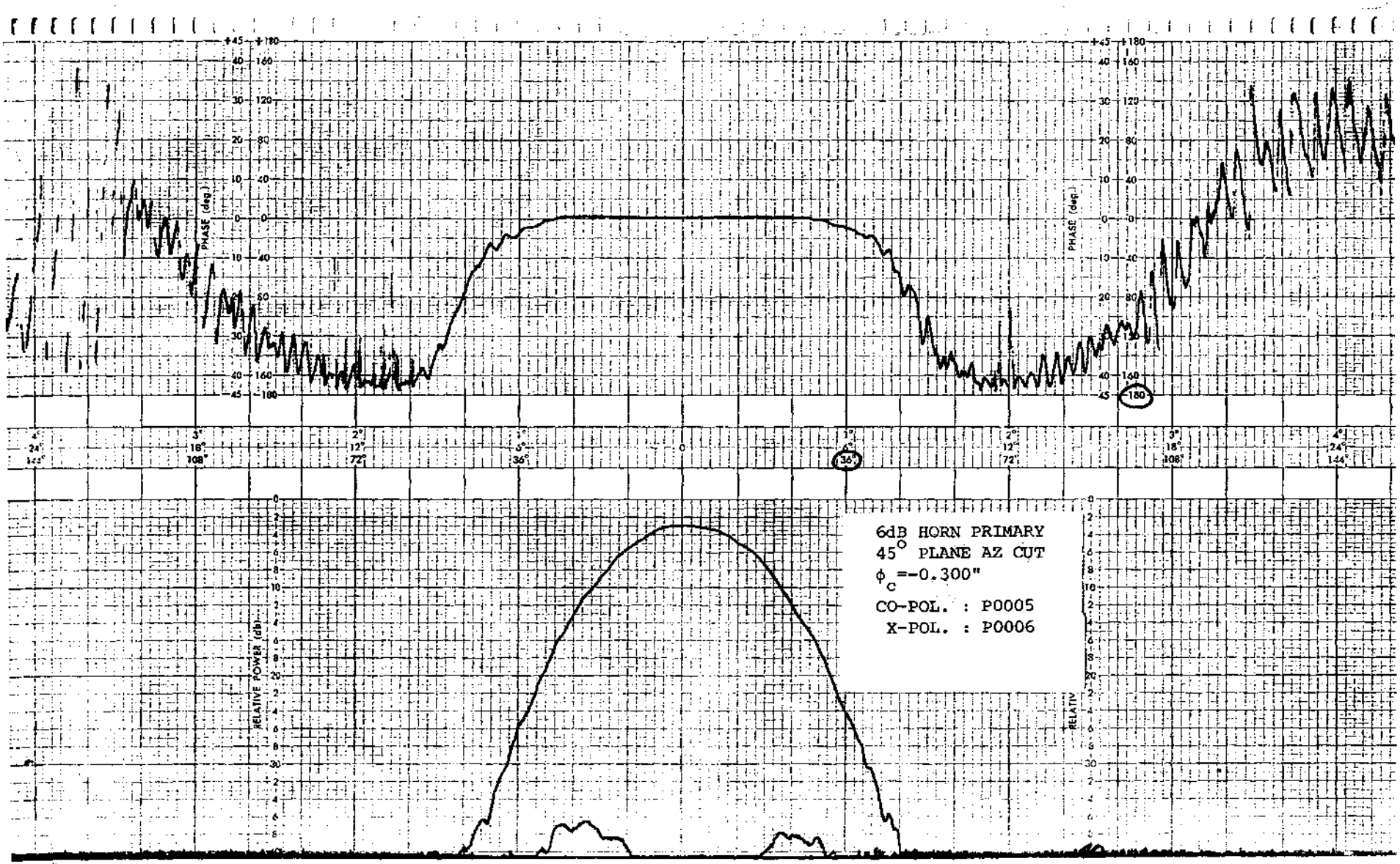
LSST - I

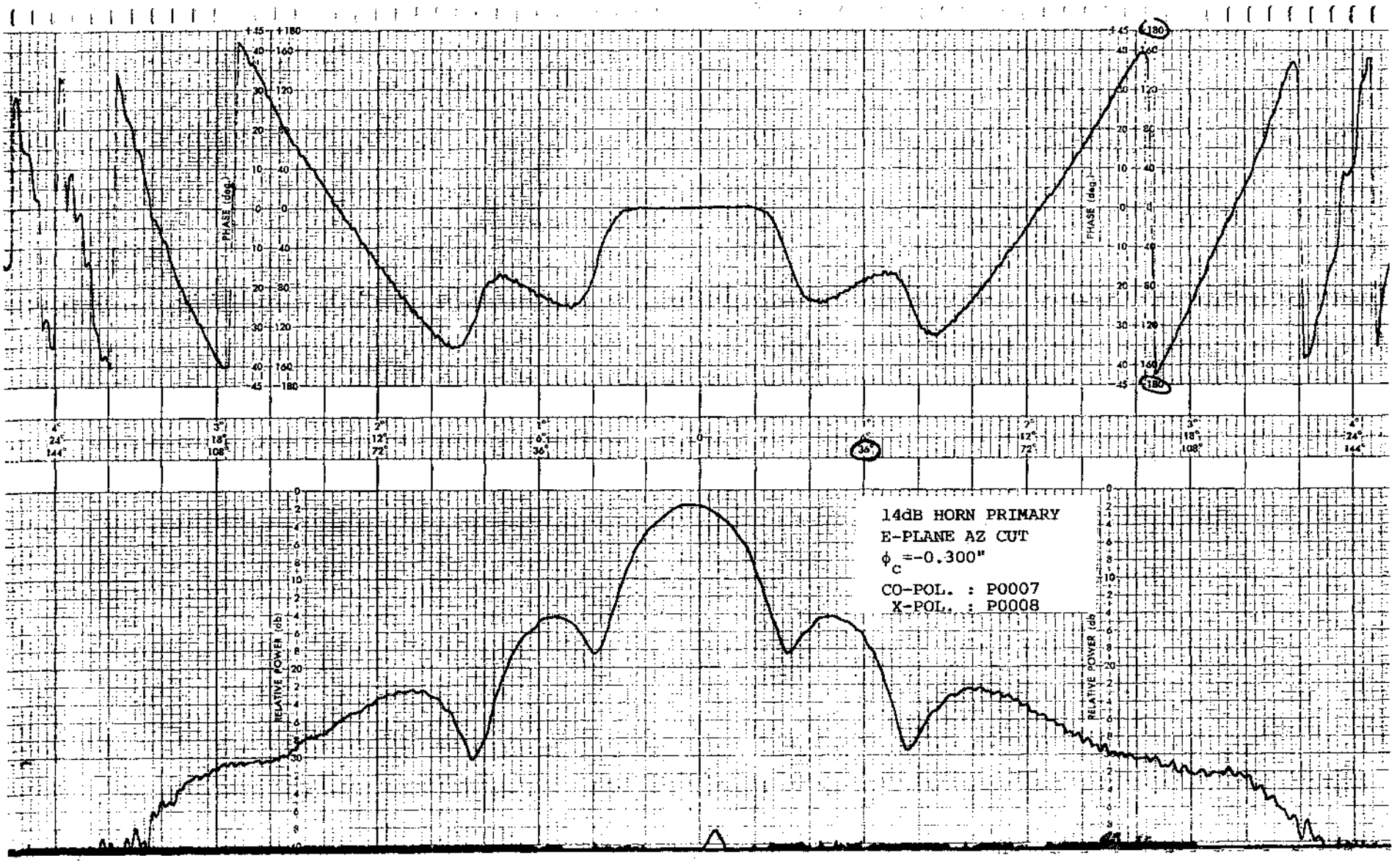
PRIMARY PATTERN LOG

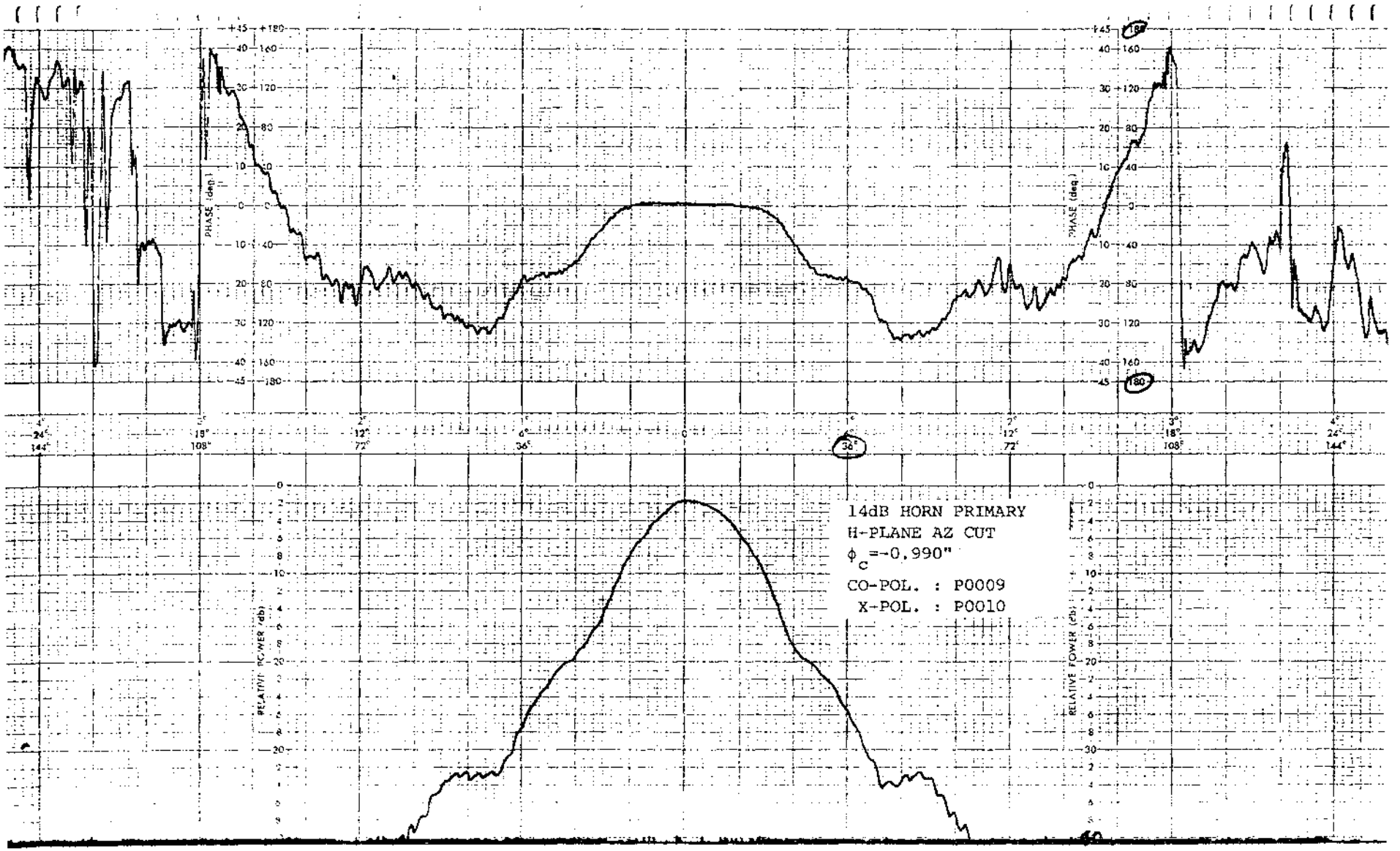
HORN	PLANE	POLARIZATION	FILE NAME	PAGE NUMBER
6 dB	E	CO	P0001	25
6 dB	E	X	P0002	25
6 dB	H	CO	P0003	26
6 dB	H	X	P0004	26
6 dB	45°	CO	P0005	27
6 dB	45°	X	P0006	27
14 dB	E	CO	P0007	28
14 dB	E	X	P0008	28
14 dB	H	CO	P0009	29
14 dB	H	X	P0010	29
14 dB	45°	CO	P0011	30
14 dB	45°	X	P0012	30

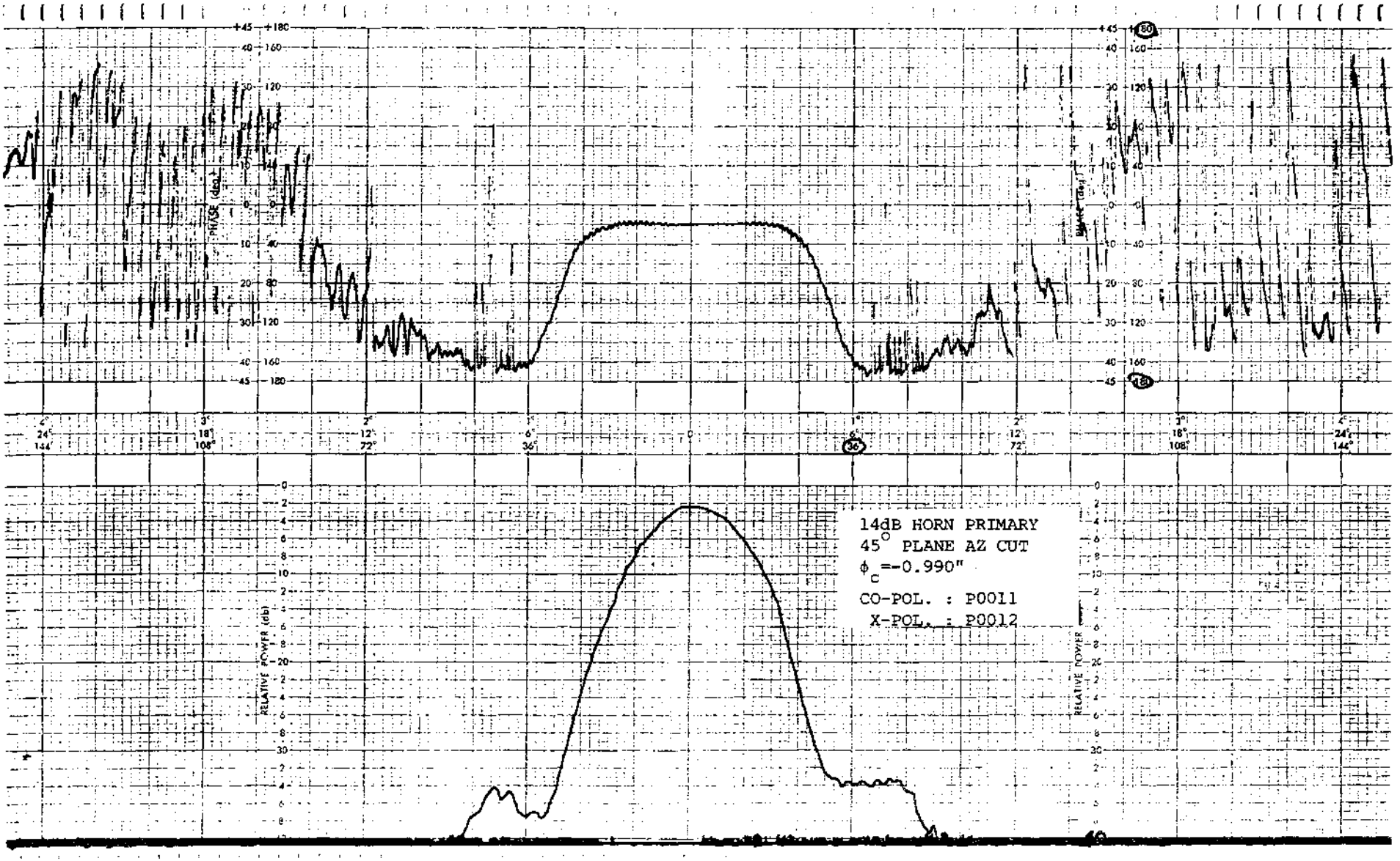

6dB HORN PRIMARY
E-PLANE AZ CUT
ϕ_c=-0.300"
CO-POL. : P0001
X-POL : P0002
PHASE (deg.)
RELATIVE POWER (db)


6dB HORN PRIMARY
H-PLANE AZ CUT
ϕ_c=-0.300"
CO-POL. : P0003
X-POL. : P0004
PHASE (deg.)
RELATIVE POWER (db)


6dB HORN PRIMARY
45° PLANE AZ CUT
ϕ_c=-0.300"
CO-POL. : P0005
X-POL. : P0006
PHASE (deg.)
RELATIVE POWER (db)


PHASE (deg.)
RELATIVE POWER (db)
14dB HORN PRIMARY
E-PLANE AZ CUT
ϕ_c=-0.300"
CO-POL. : P0007
X-POL. : P0008

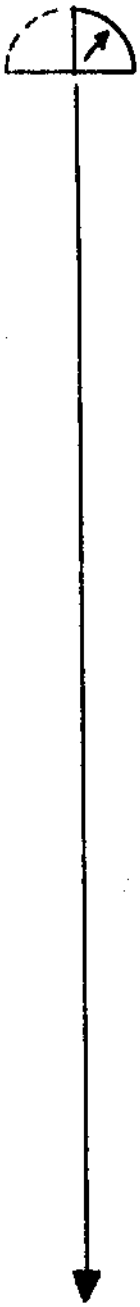

14dB HORN PRIMARY
H-PLANE AZ CUT
ϕ_c=-0.990"
CO-POL. : P0009
X-POL. : P0010
PHASE (deg.)
RELATIVE POWER (db)


14dB HORN PRIMARY
45° PLANE AZ CUT
ϕ_c=-0.990"
CO-POL. : P0011
X-POL. : P0012
PHASE (deg.)
RELATIVE POWER (dB)

LSST - II

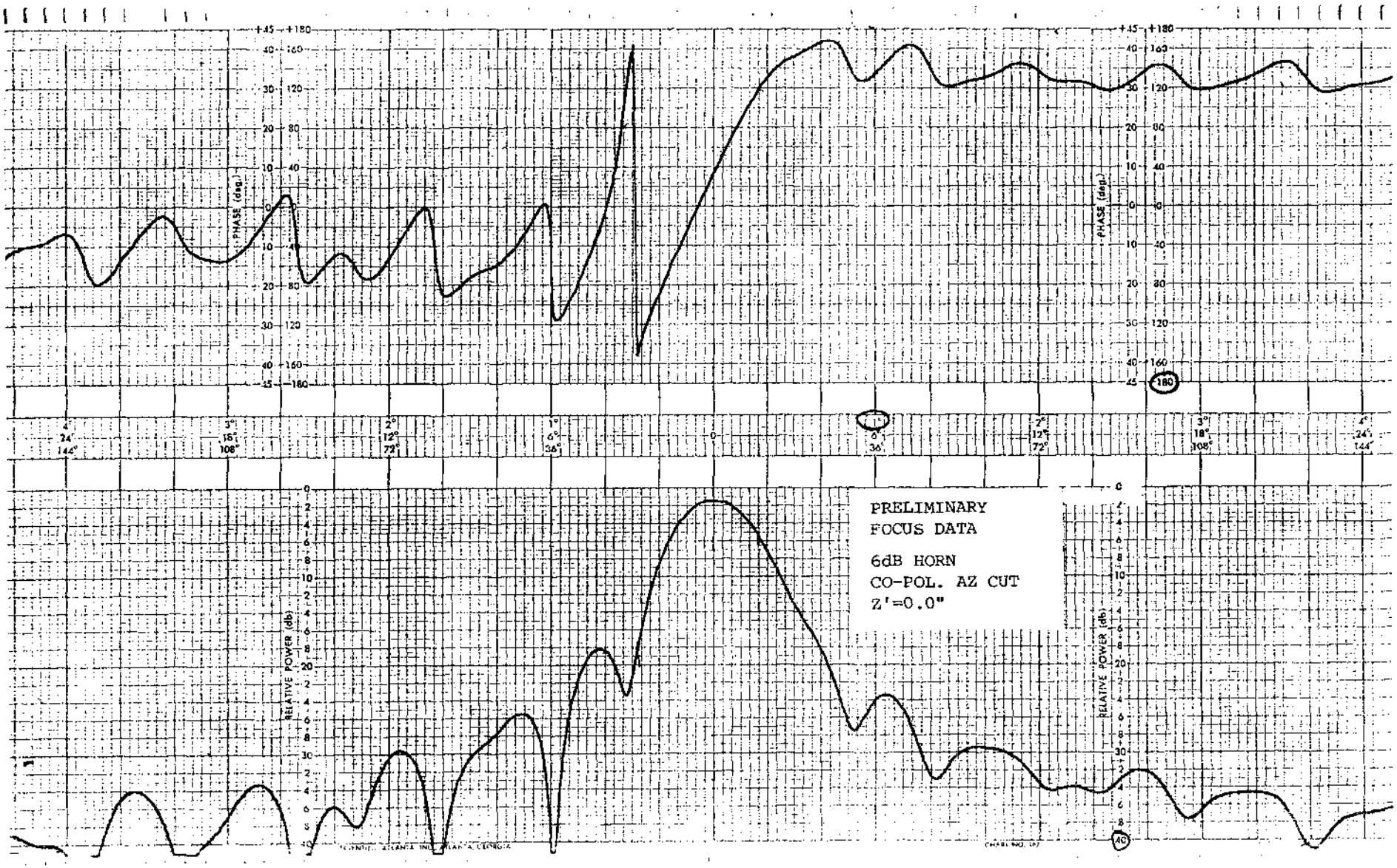
PRELIMINARY FOCUS DATA

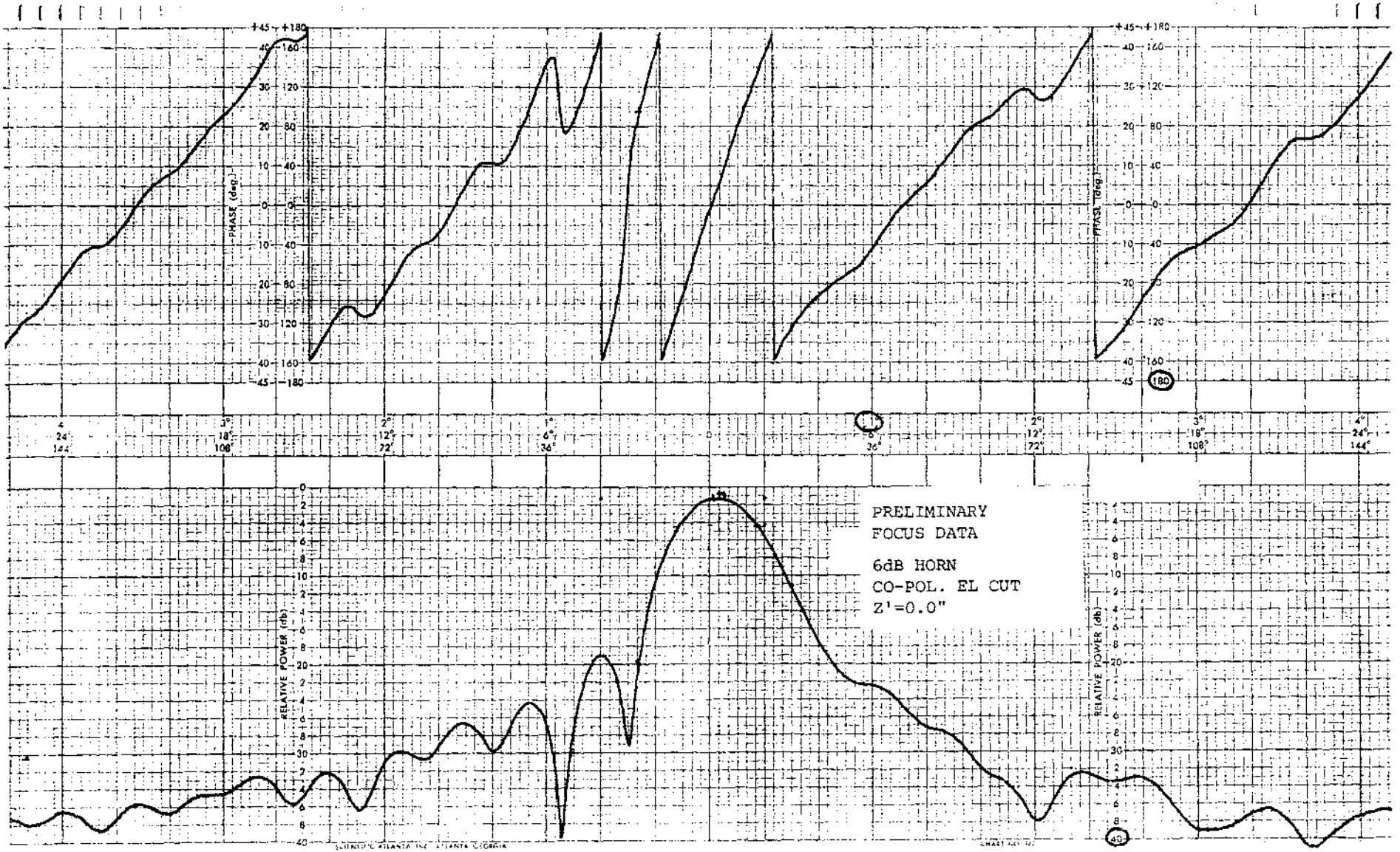
SECONDARY PATTERN LOG

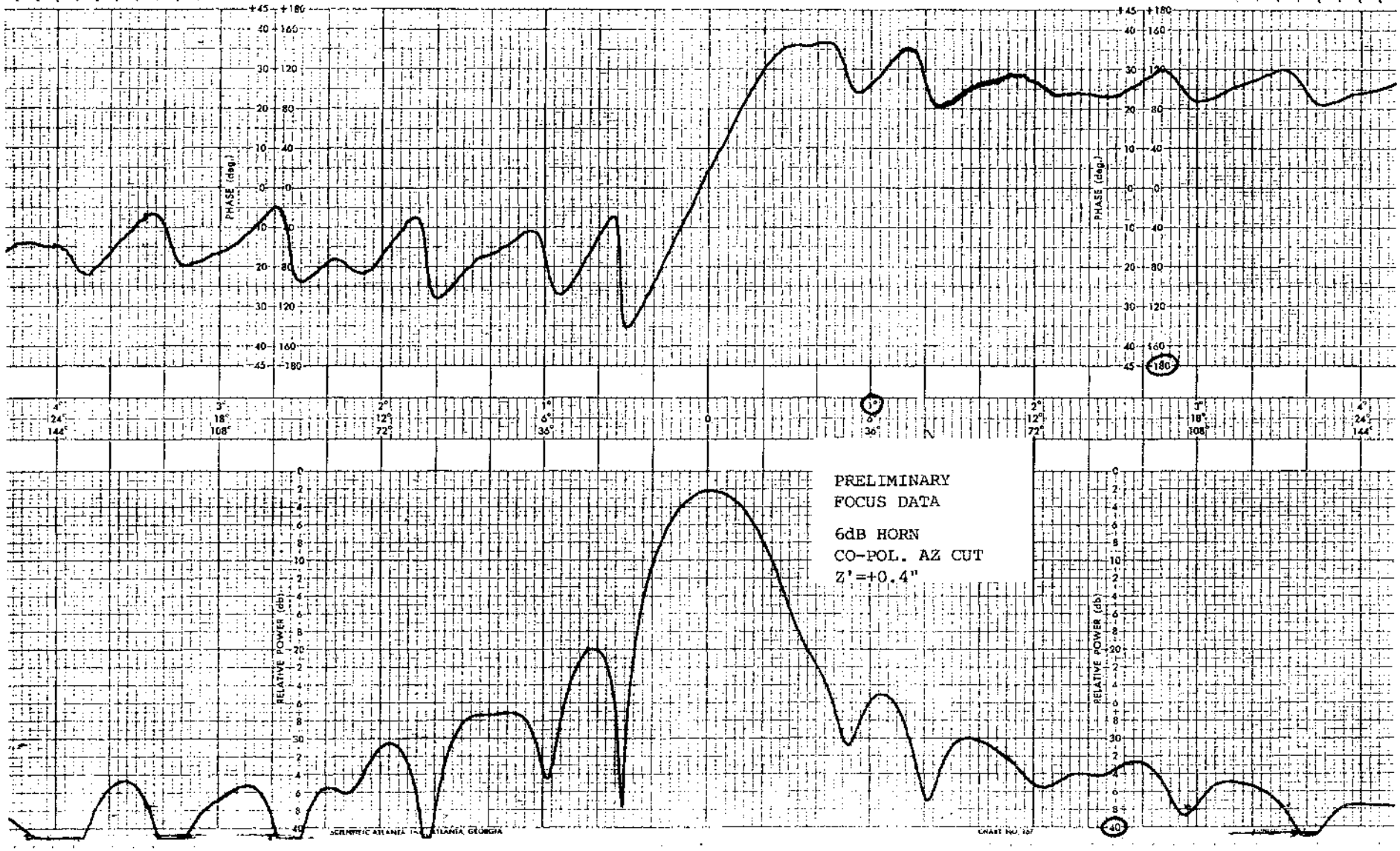
CONFIGURATION	HORN	FEED AXIAL POSITION	POL.	PEAK GAIN (dBi)	PATTERN	PAGE NUMBER
	6 dB	0.0"*	CO	50.36	± 5° AZ	32
	6 dB	0.0"	CO	"	± 5° EL	33
	6 dB	+0.4"	CO	50.70	± 5° AZ	34
	6 dB	+0.4"	CO	"	± 5° EL	35
	6 dB	+0.8"	CO	50.83	± 5° AZ	36
	6 dB	+0.8"	CO	"	± 5° EL	37
	6 dB	+1.2"#	CO	50.85	± 5° AZ	38
	6 dB	+1.2"	CO	"	± 5° EL	39
	6 dB	+1.6"	CO	50.77	± 5° AZ	40
	6 dB	+1.6"	CO	"	± 5° EL	41
	6 dB	+1.8"	CO	50.66	± 5° AZ	42
	6 dB	+1.8"	CO	"	± 5° EL	43
	6 dB	+2.0"	CO	50.50	± 5° AZ	44
	6 dB	+2.0"	CO	"	± 5° EL	45
	14 dB	0.0"*	CO	50.00	± 5° AZ	46
	14 dB	0.0"	CO	"	± 5° EL	47
	14 dB	+0.8"	CO	50.48	± 5° AZ	48
	14 dB	+0.8"	CO	"	± 5° EL	49
	14 dB	+1.2"#	CO	50.52	± 5° AZ	50
	14 dB	+1.2"	CO	"	± 5° EL	51
	14 dB	+1.6"	CO	50.37	± 5° AZ	52
	14 dB	+1.6"	CO	"	± 5° EL	53
	14 dB	+1.8"	CO	50.35	± 5° AZ	54
	14 dB	+1.8"	CO	"	± 5° EL	55
	14 dB	+2.0"	CO	50.36	± 5° AZ	56
	14 dB	+2.0"	CO	"	+ 5° EL	57

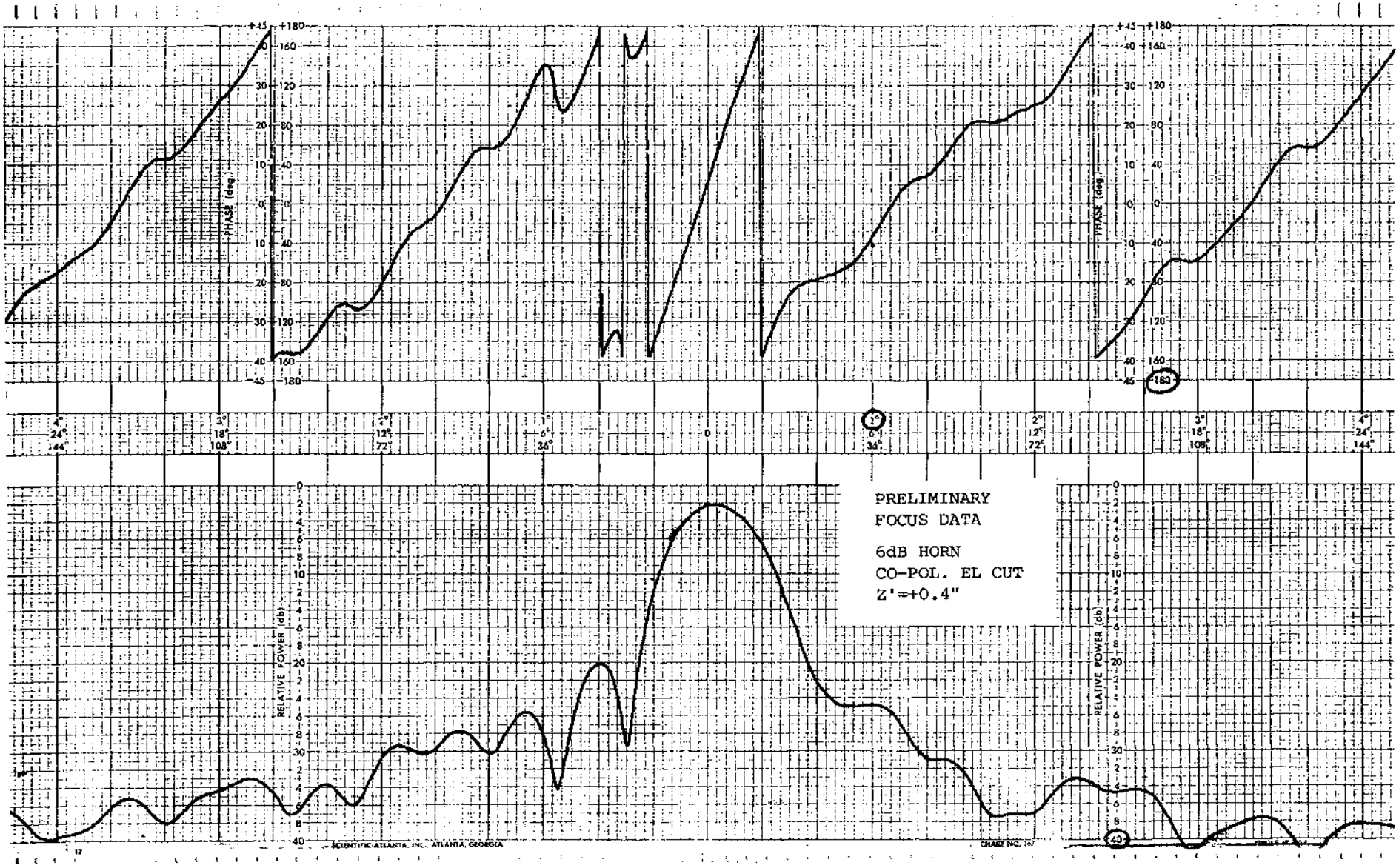
* Z' = 0.0" is the mechanical focus position as determined with alignment tool.

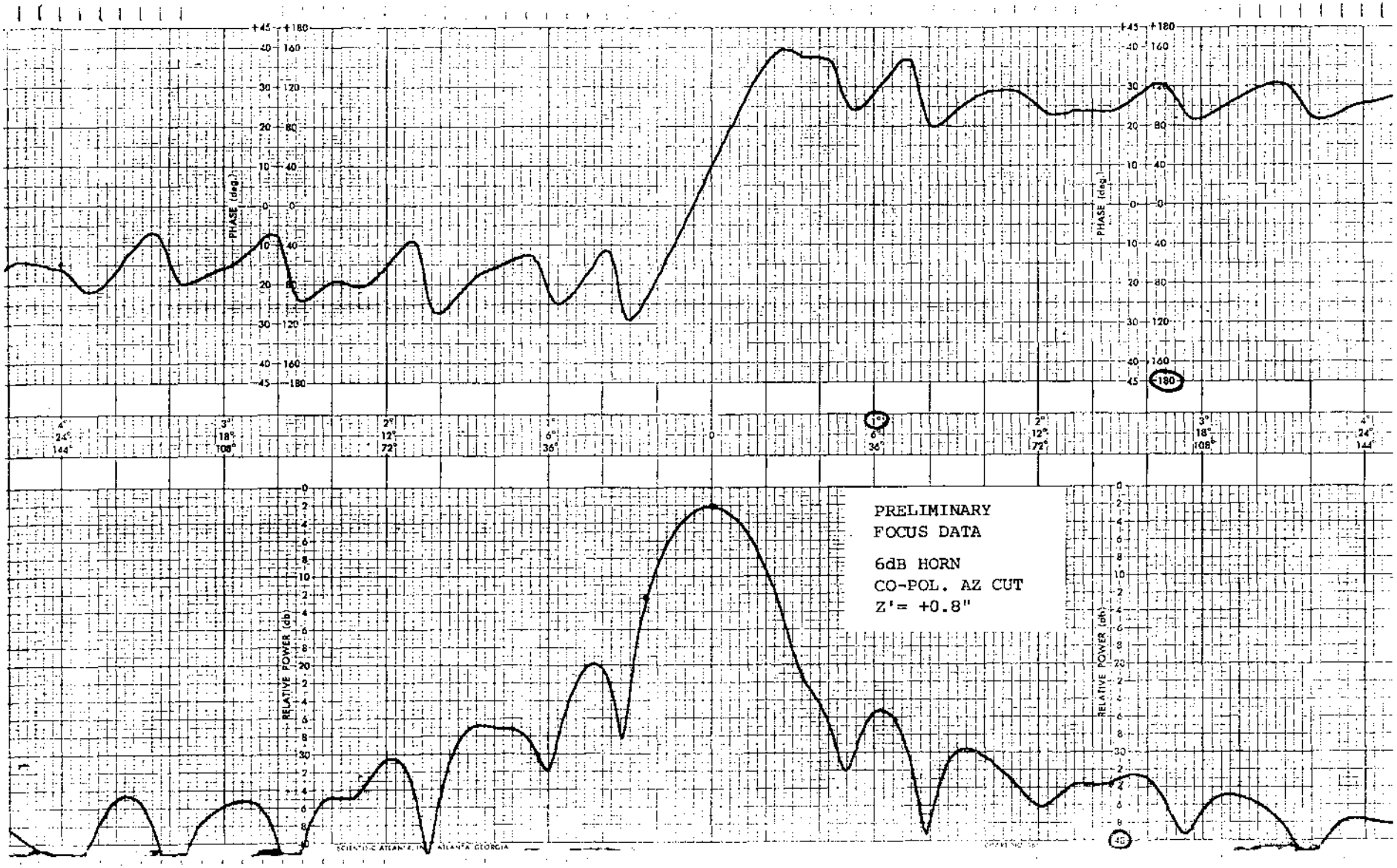
\# Z' = +1.2" is the range corrected focus position used for all secondary measurements.

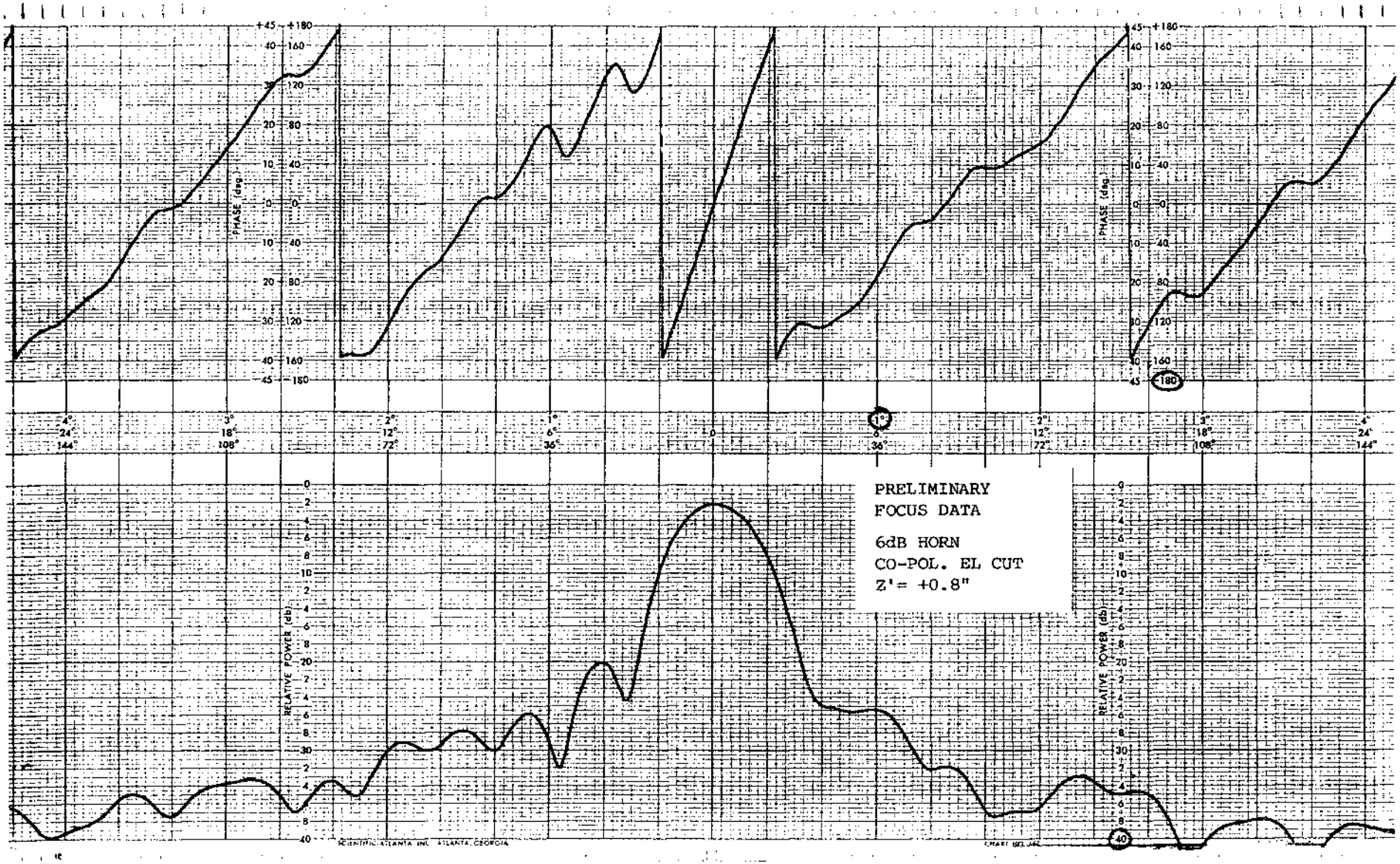

PRELIMINARY
FOCUS DATA
6dB HORN
CO-POL. AZ CUT
Z'=0.0"
PHASE (deg.)
RELATIVE POWER (db)

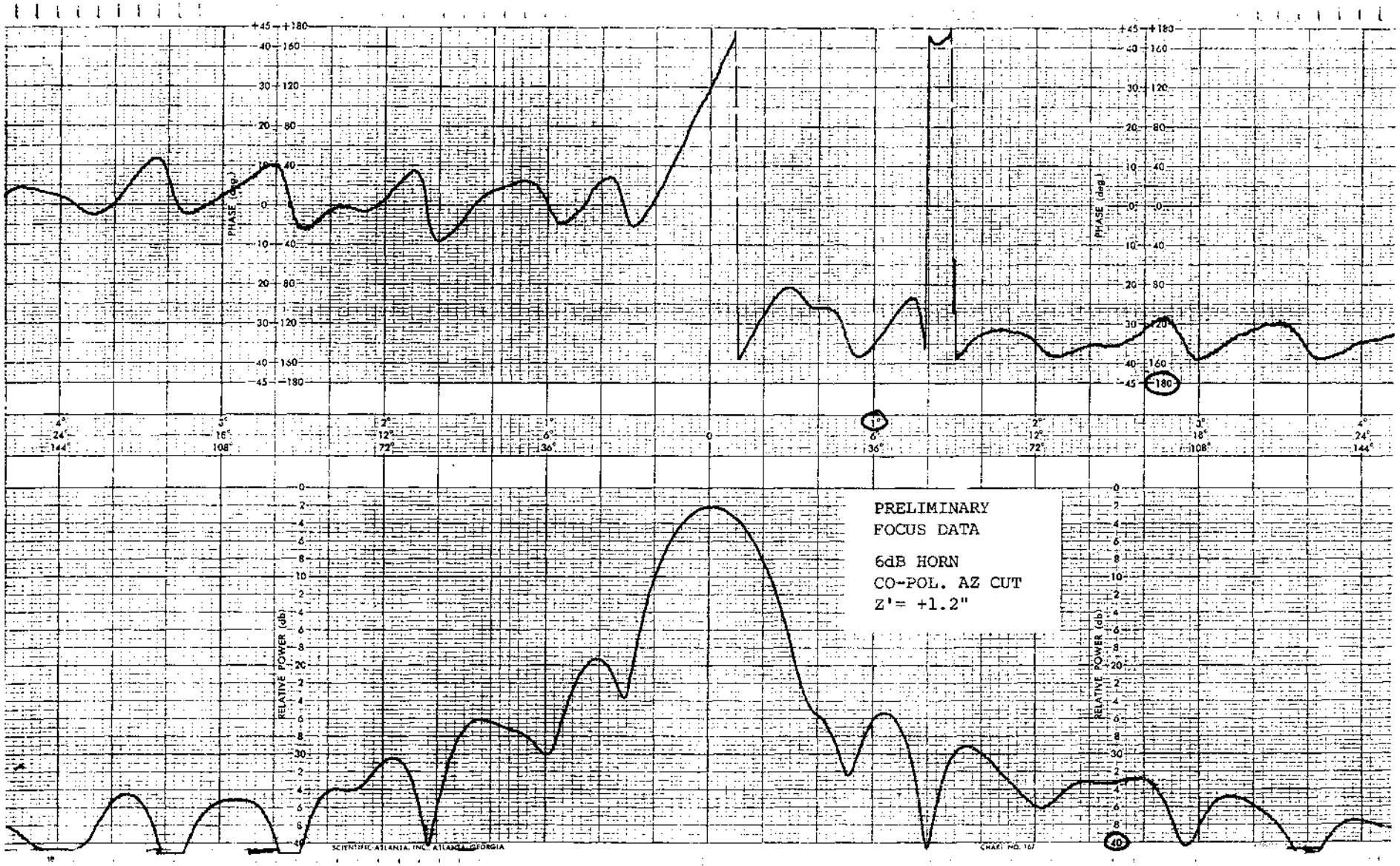

PRELIMINARY
FOCUS DATA
6dB HORN
CO-POL. EL CUT
Z'=0.0"
PHASE (deg.)
RELATIVE POWER (db)

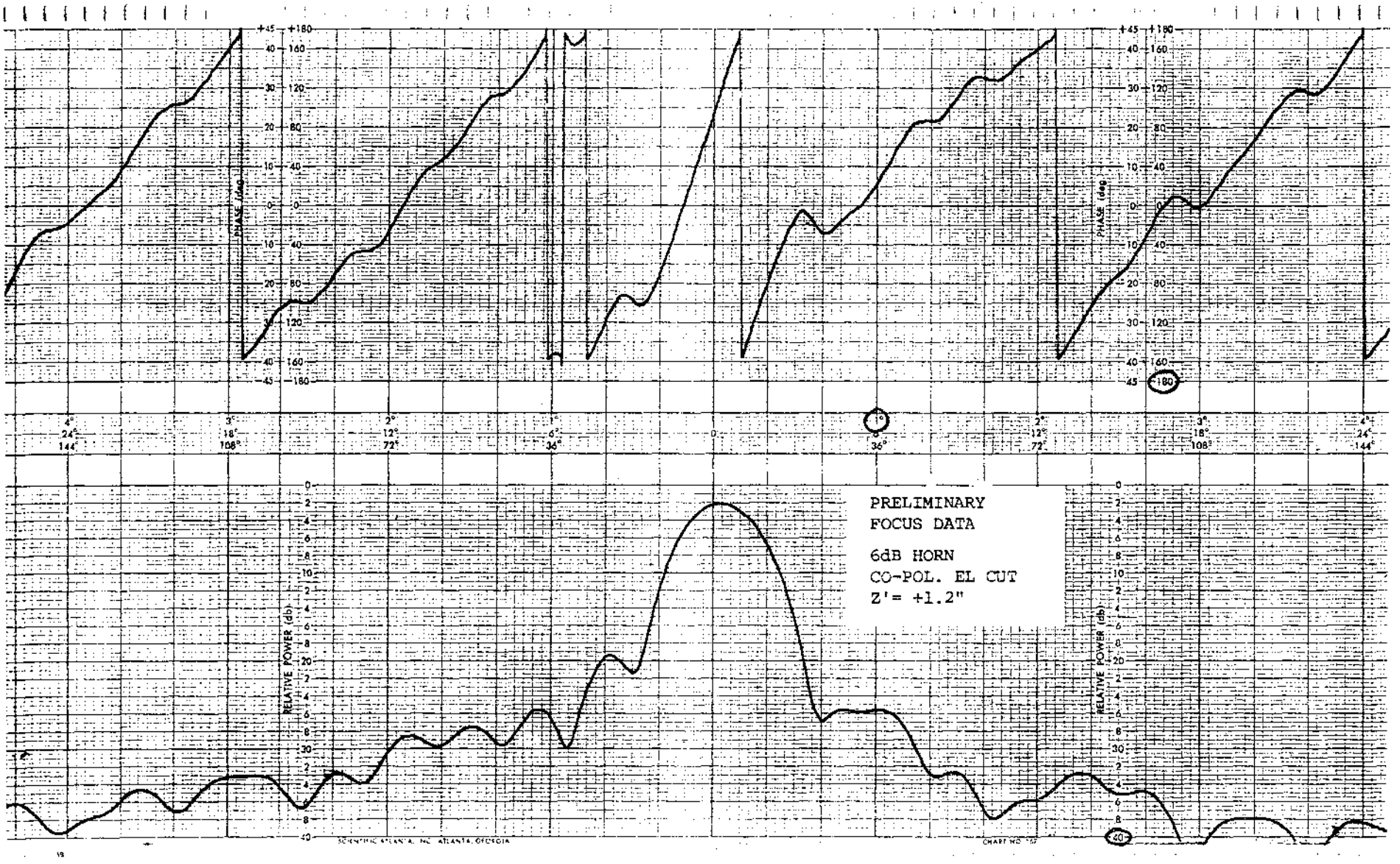

PHASE (deg.)
RELATIVE POWER (db)
PRELIMINARY
FOCUS DATA
6dB HORN
CO-POL. AZ CUT
Z'=+0.4"

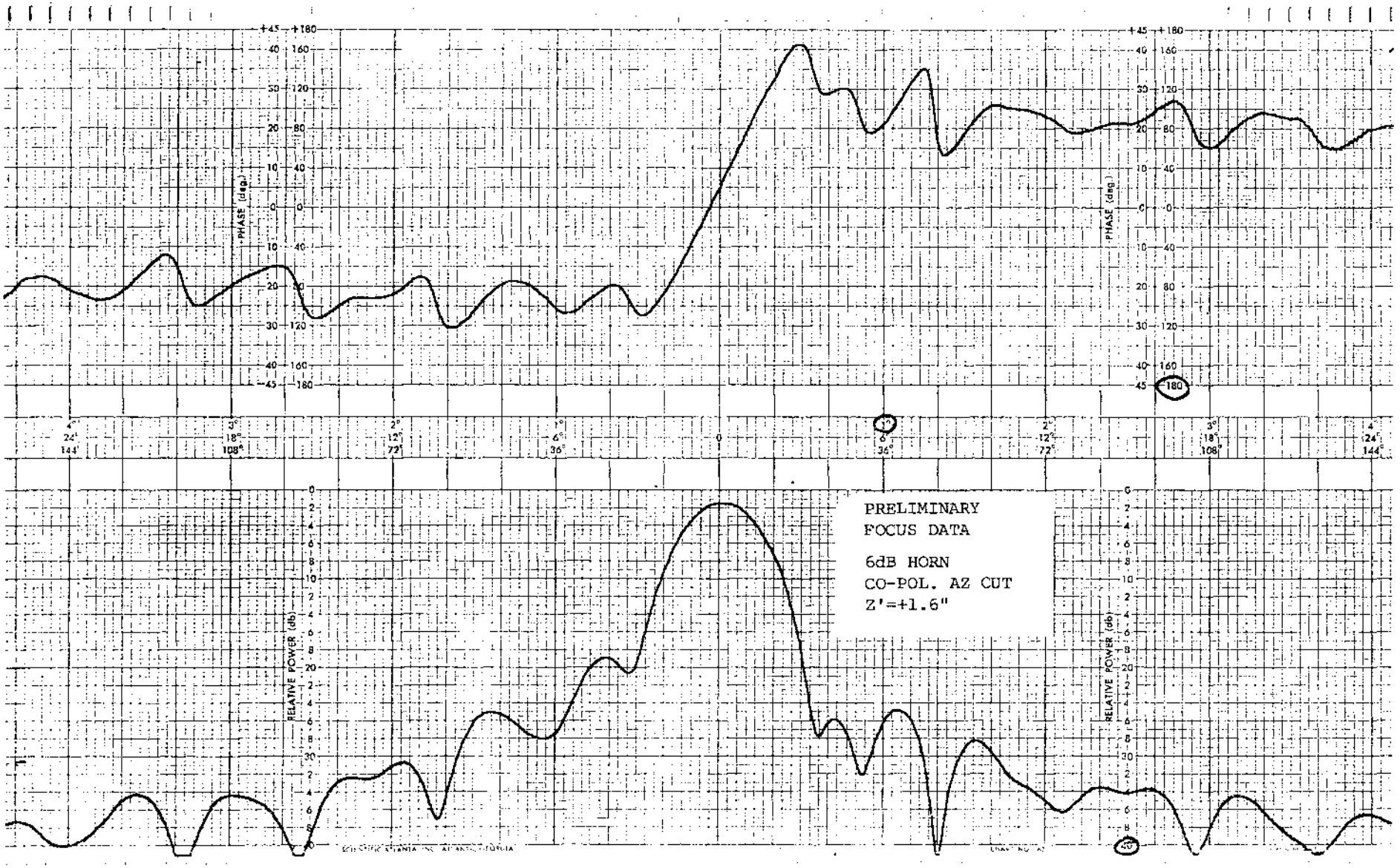

PRELIMINARY
FOCUS DATA
6dB HORN
CO-POL. EL CUT
Z'=+0.4"
PHASE (deg)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

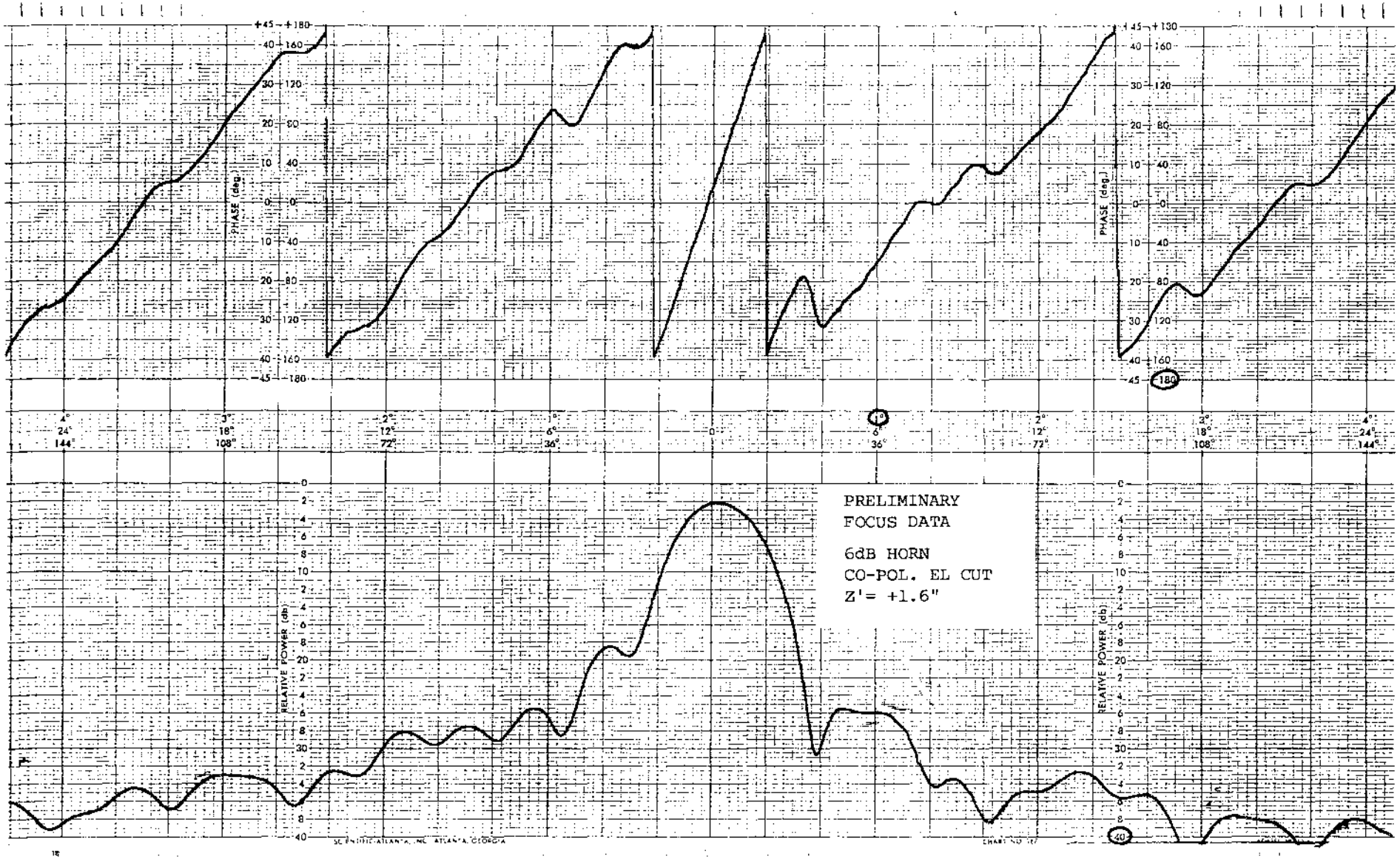

PHASE (deg.)
RELATIVE POWER (db)
PRELIMINARY
FOCUS DATA
6dB HORN
CO-POL. AZ CUT
Z'= +0.8"

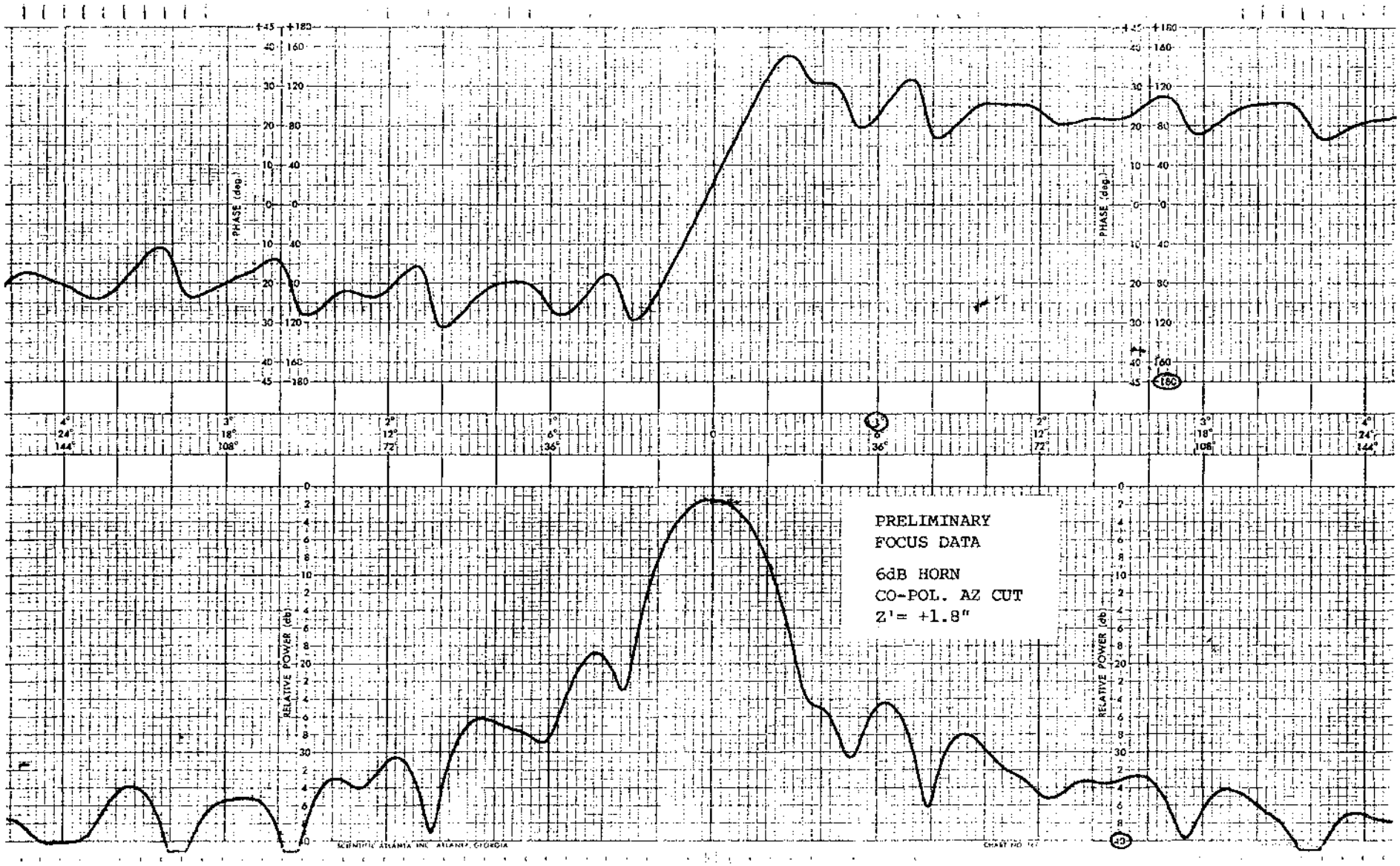

PHASE (deg.)
RELATIVE POWER (db)
PRELIMINARY
FOCUS DATA
6dB HORN
CO-POL. EL CUT
Z'= +0.8"

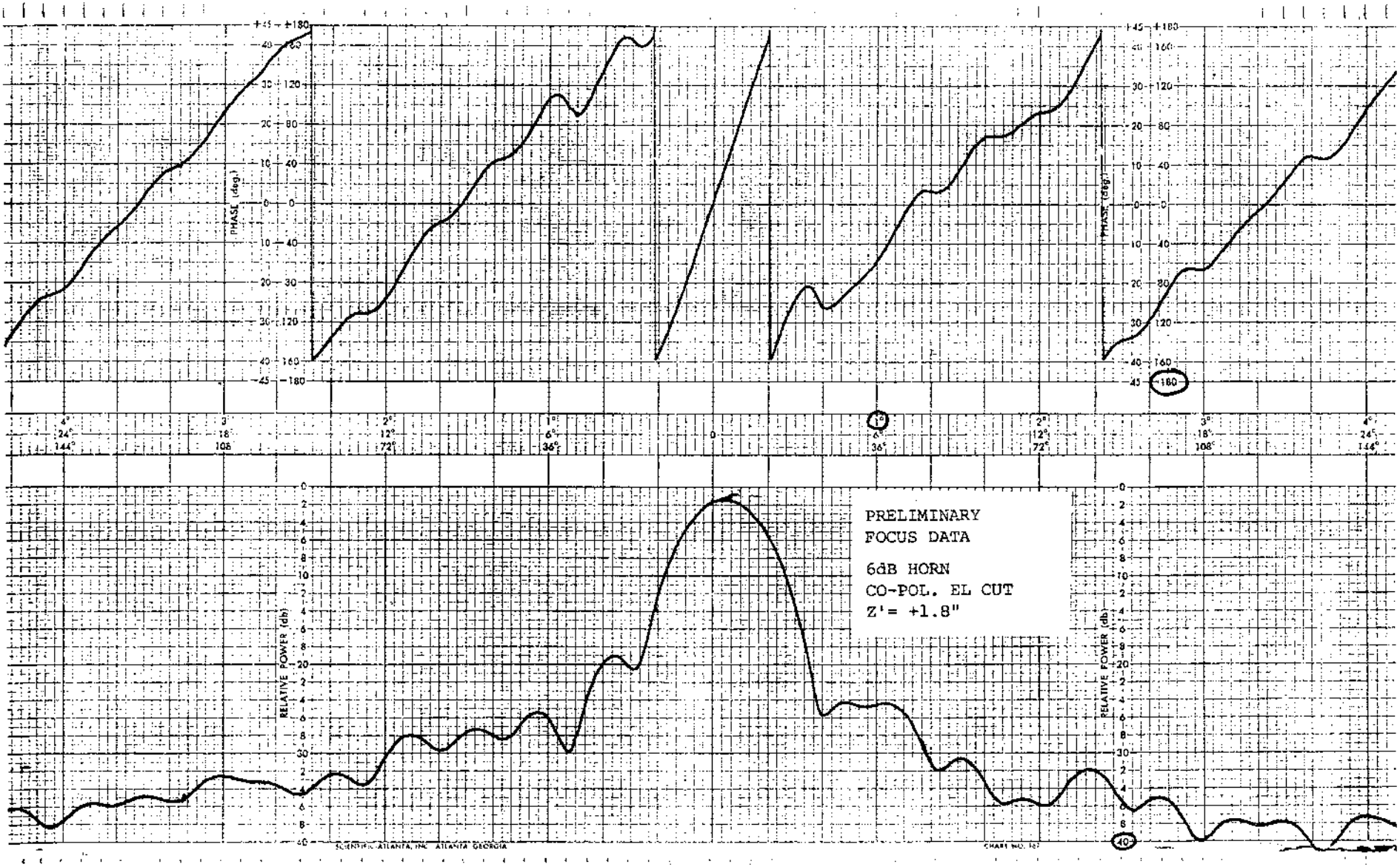

PRELIMINARY
FOCUS DATA
6dB HORN
CO-POL. AZ CUT
Z'= +1.2"
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC. ATLANTA, GEORGIA
CHART NO. 107

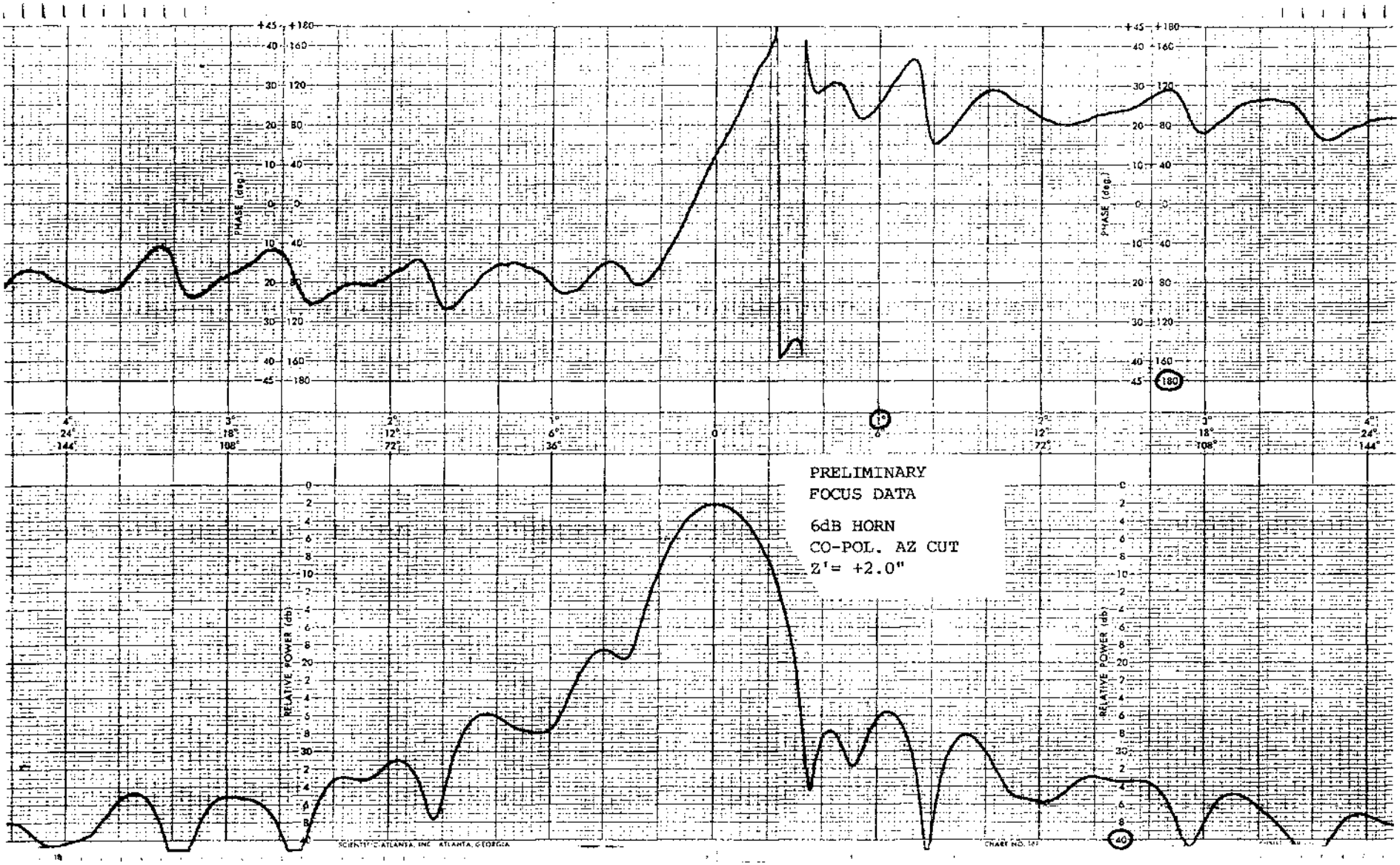

PRELIMINARY
FOCUS DATA
6dB HORN
CO-POL. EL CUT
Z'= +1.2"
PHASE (deg)
RELATIVE POWER (db)
SCIENTIFIC ATLANTA, INC. ATLANTA, GEORGIA

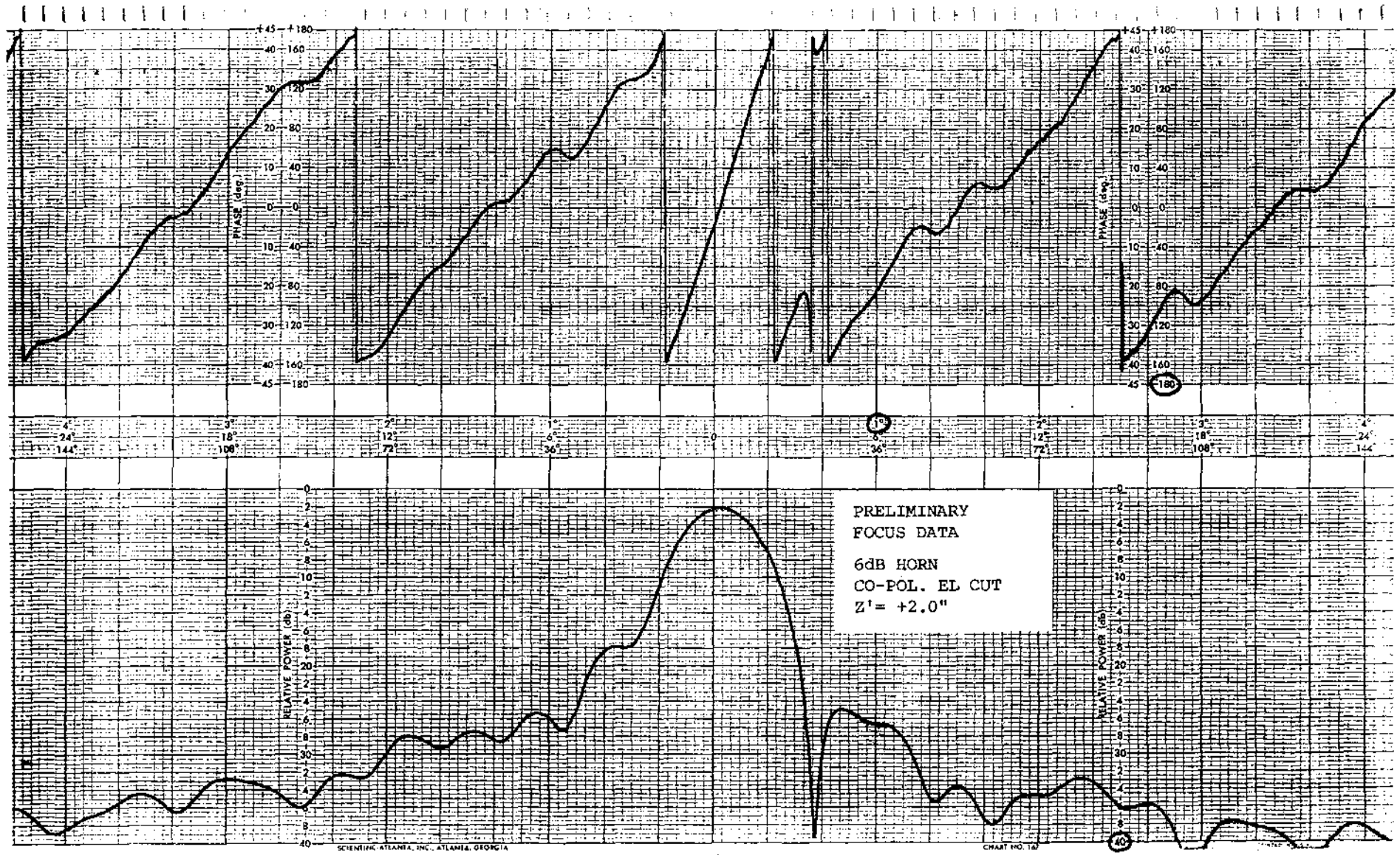

PHASE (deg.)
RELATIVE POWER (db)
PRELIMINARY
FOCUS DATA
6dB HORN
CO-POL. AZ CUT
Z'=+1.6"

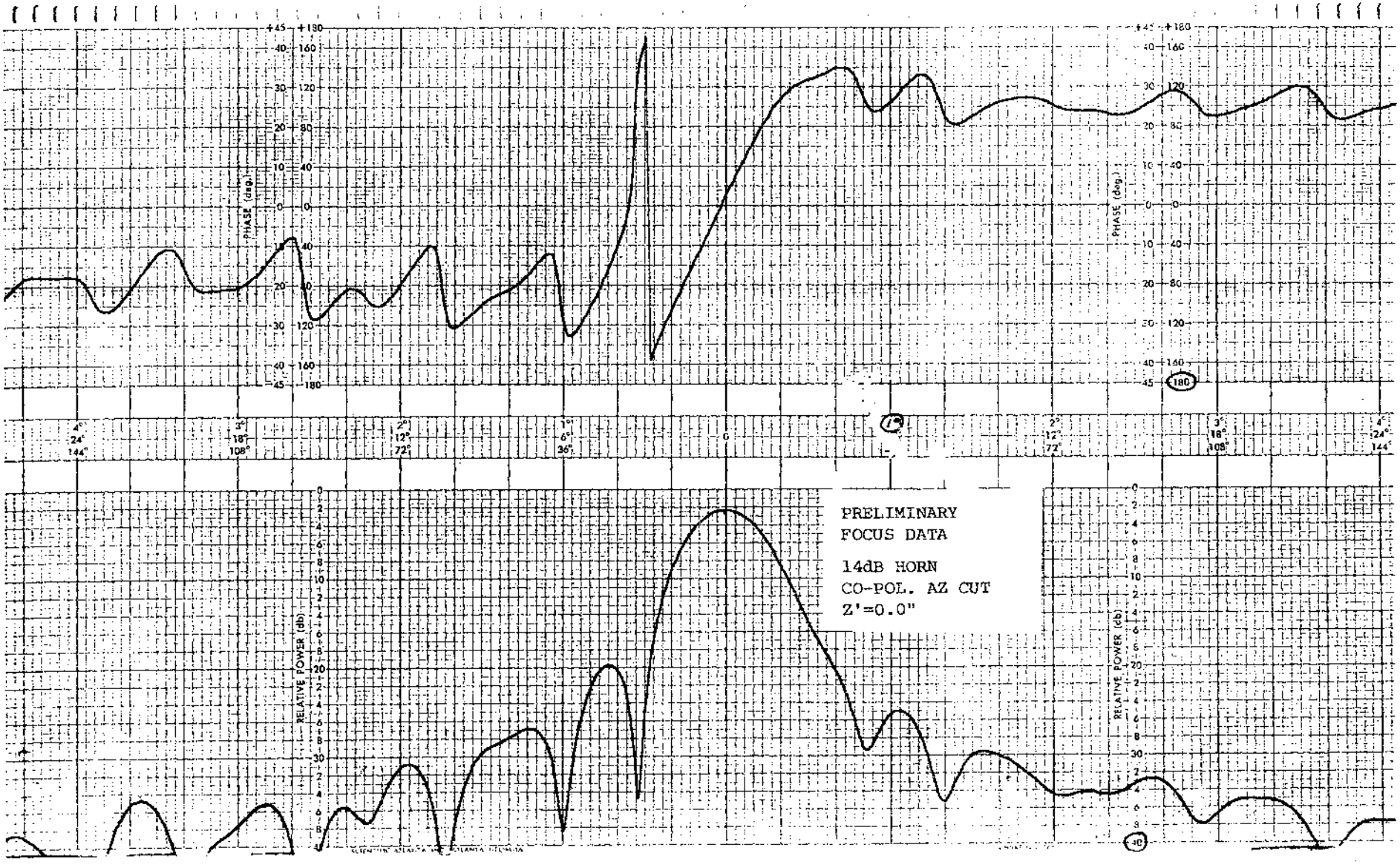

PRELIMINARY
FOCUS DATA
6dB HORN
CO-POL. EL CUT
Z'= +1.6"
PHASE (deg.)
RELATIVE POWER (db)

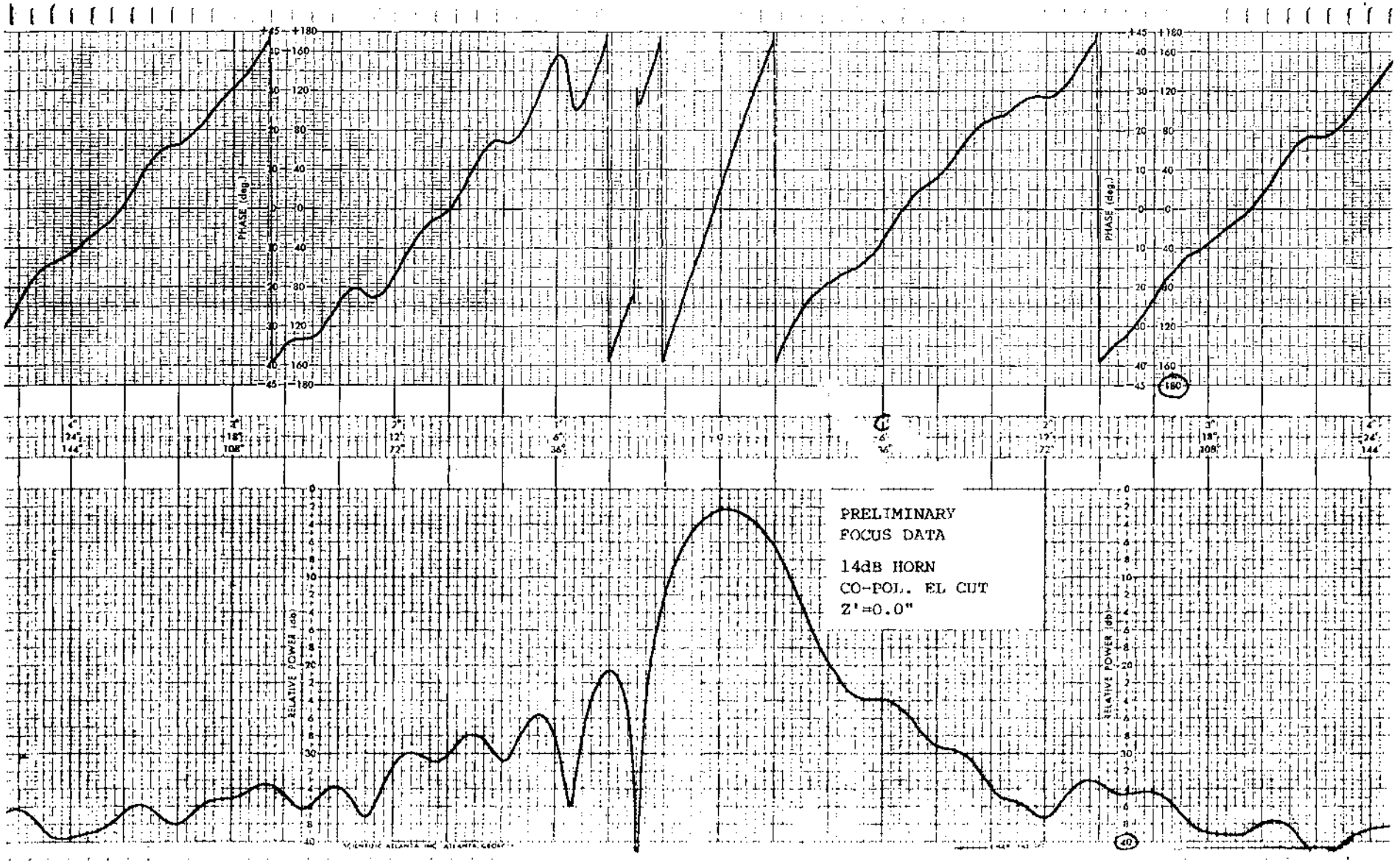

PRELIMINARY
FOCUS DATA
6dB HORN
CO-POL. AZ CUT
Z'= +1.8"
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC ATLANTA INC. ATLANTA, GEORGIA

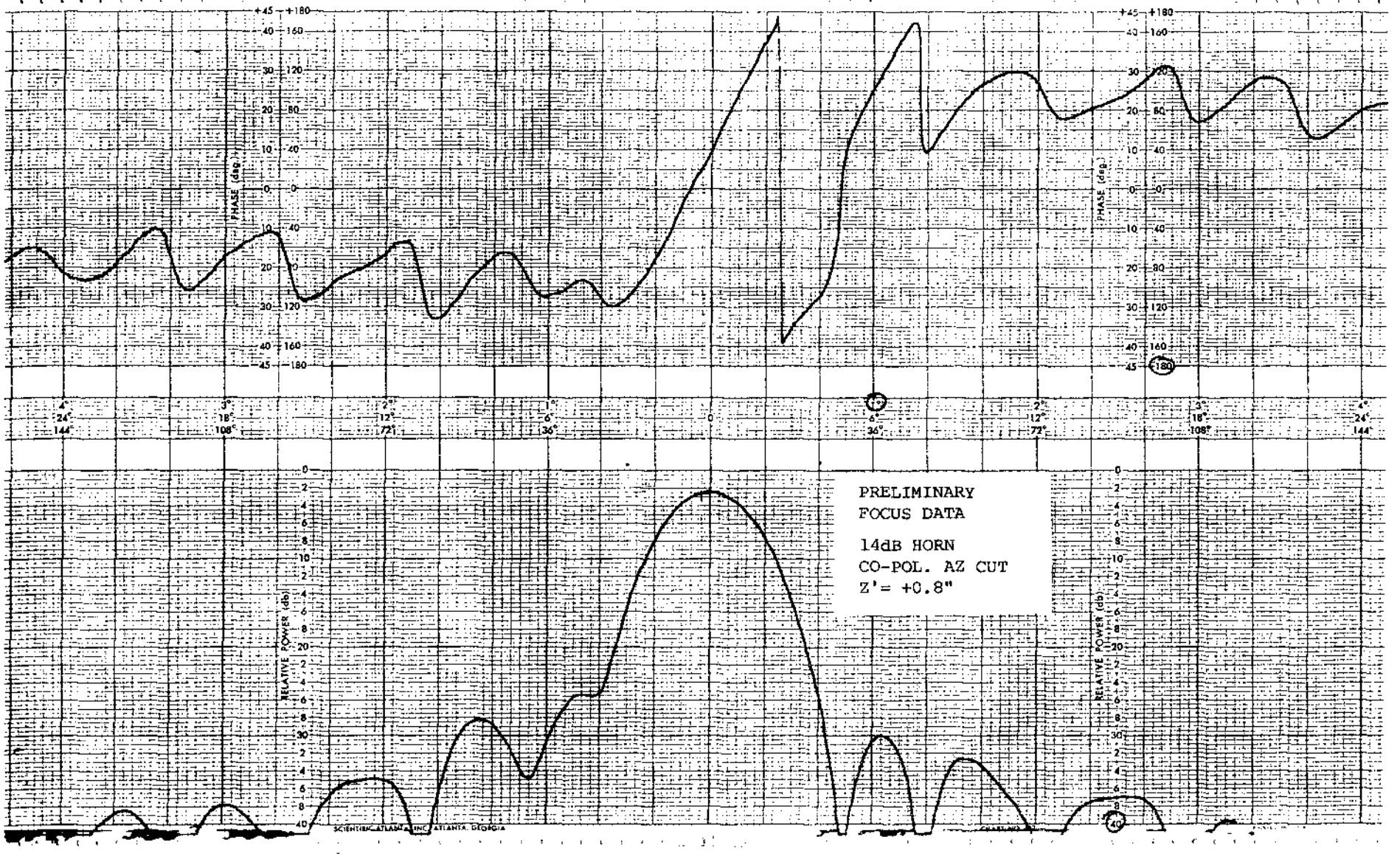

PRELIMINARY
FOCUS DATA
6dB HORN
CO-POL. EL CUT
Z'= +1.8"
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC. ATLANTA GEORGIA
CHART NO. 107

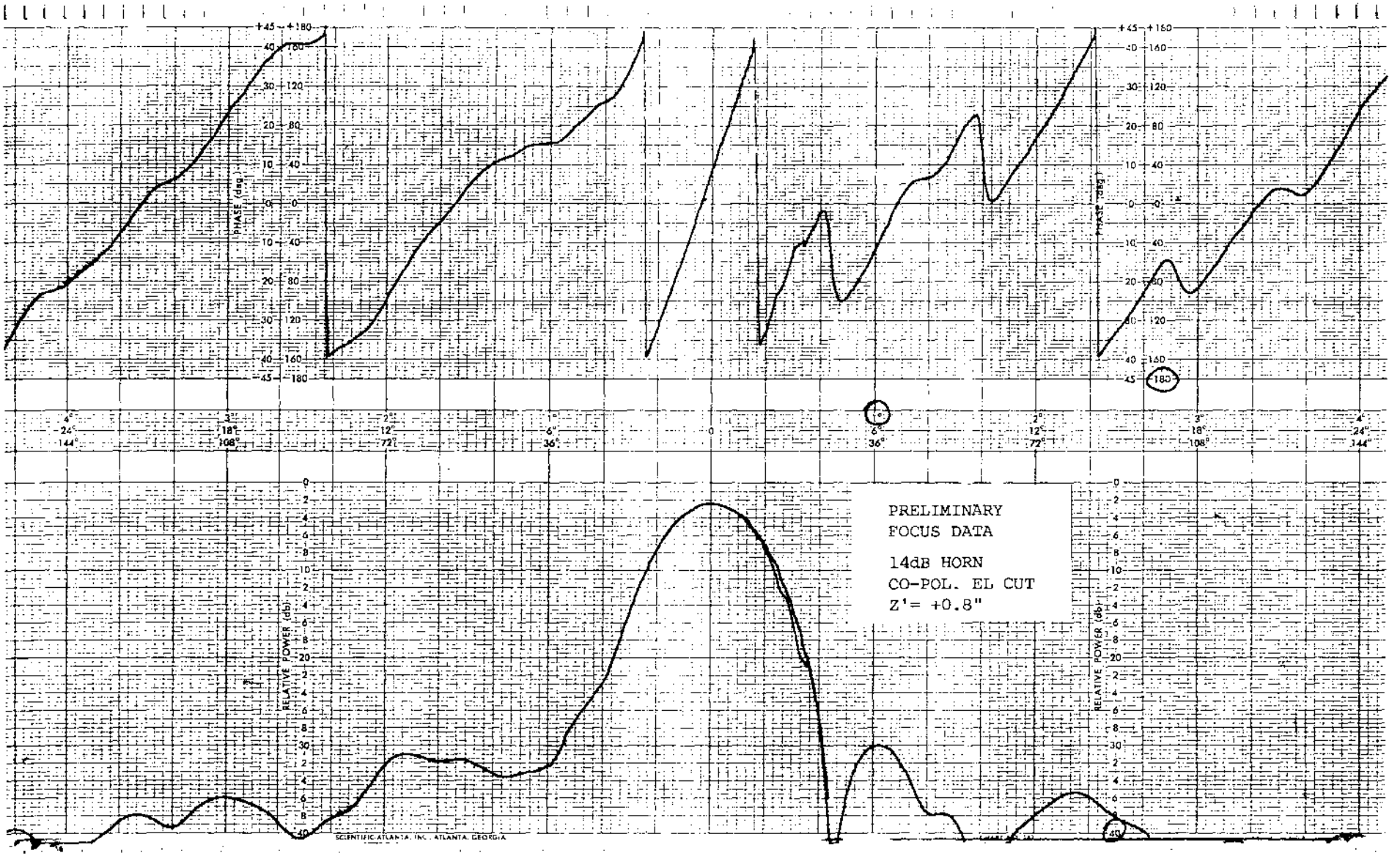

PRELIMINARY
FOCUS DATA
6dB HORN
CO-POL. AZ CUT
Z'= +2.0"
PHASE (deg.)
RELATIVE POWER (db)

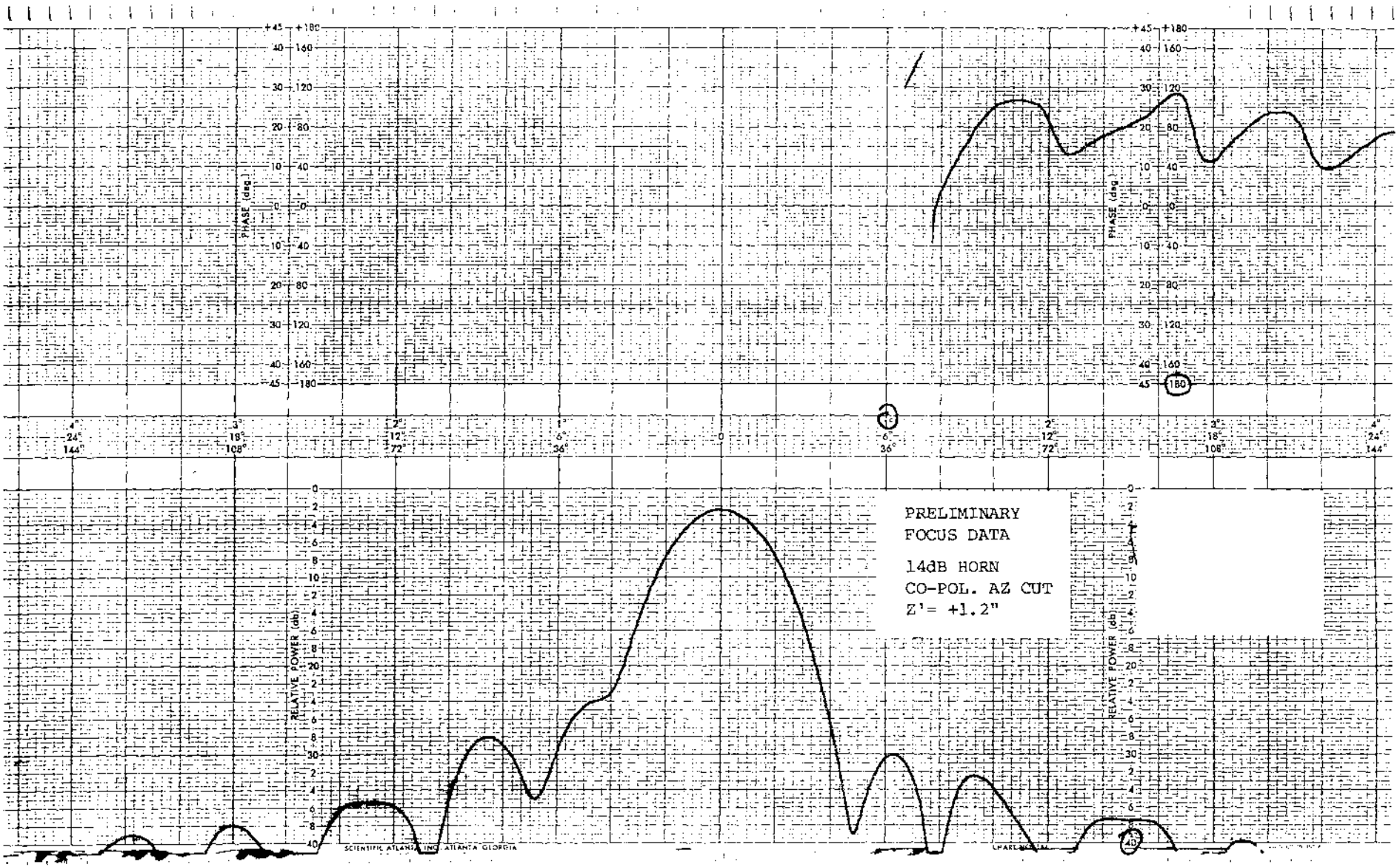

PRELIMINARY
FOCUS DATA
6dB HORN
CO-POL. EL CUT
Z'= +2.0"
PHASE (deg)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA
CHART NO. 147

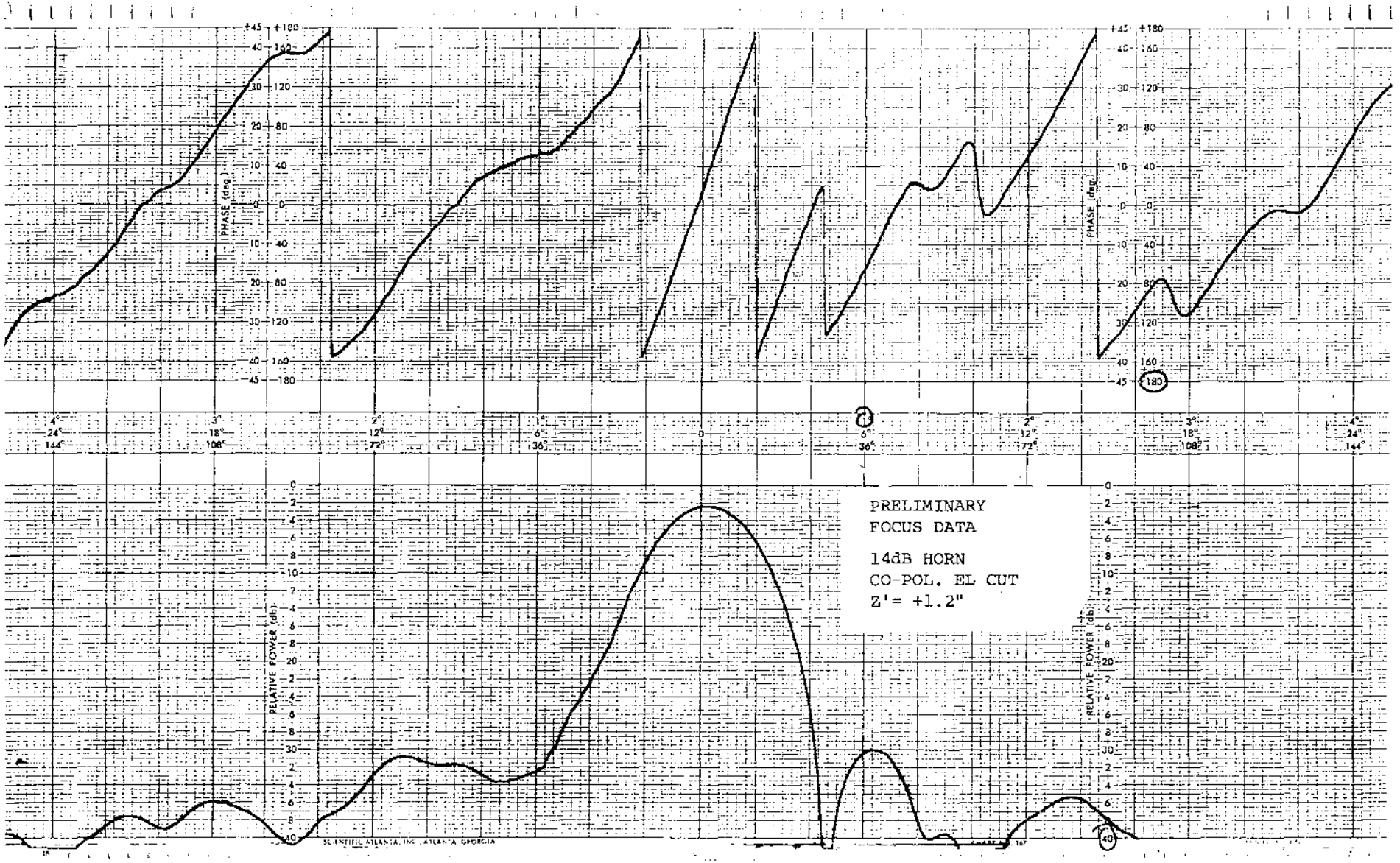

PHASE (deg.)
RELATIVE POWER (db)
PRELIMINARY
FOCUS DATA
14dB HORN
CO-POL. AZ CUT
Z'=0.0"

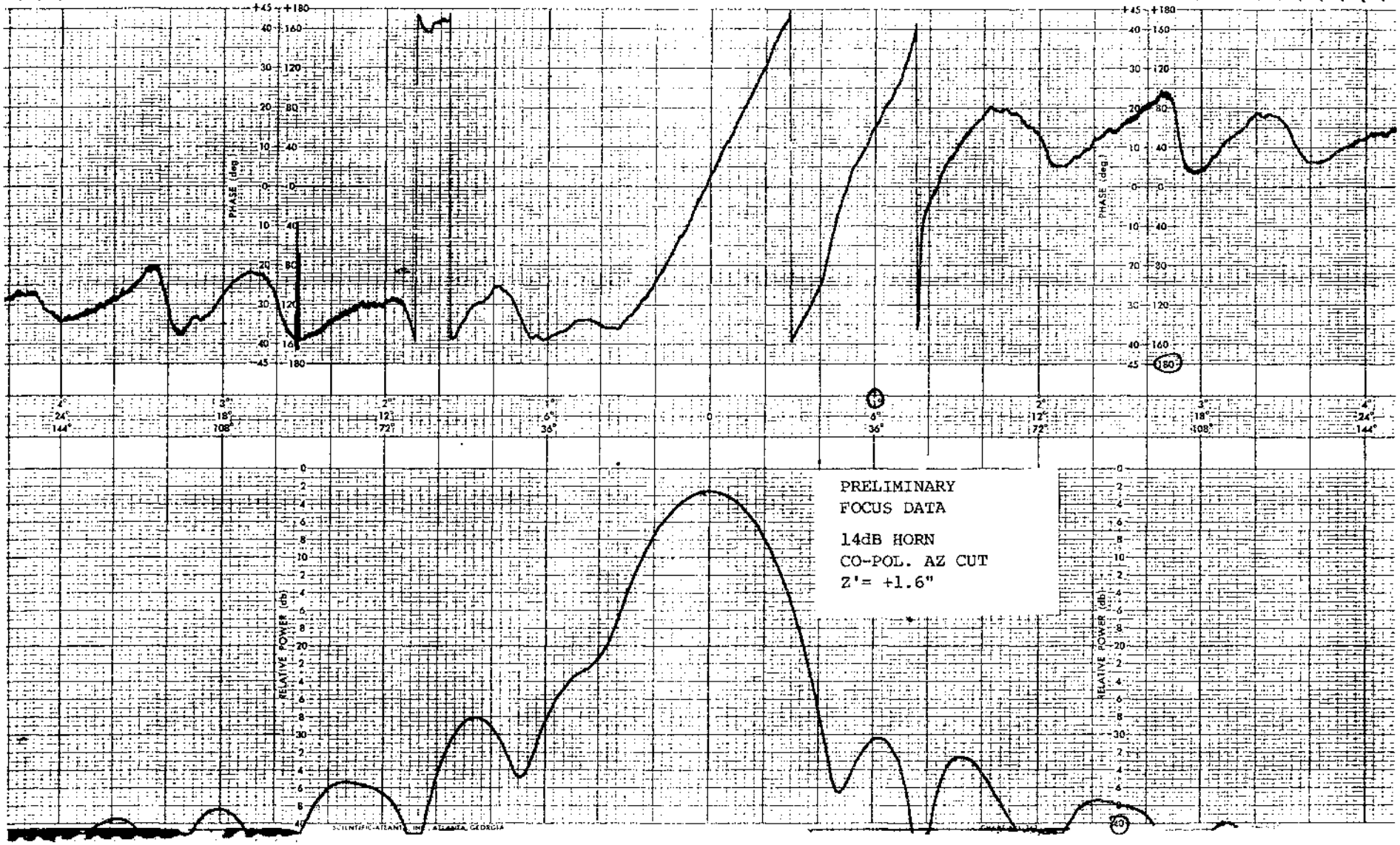

PRELIMINARY
FOCUS DATA
14dB HORN
CO-POL. EL CUT
Z'=0.0"
PHASE (deg.)
RELATIVE POWER (db)

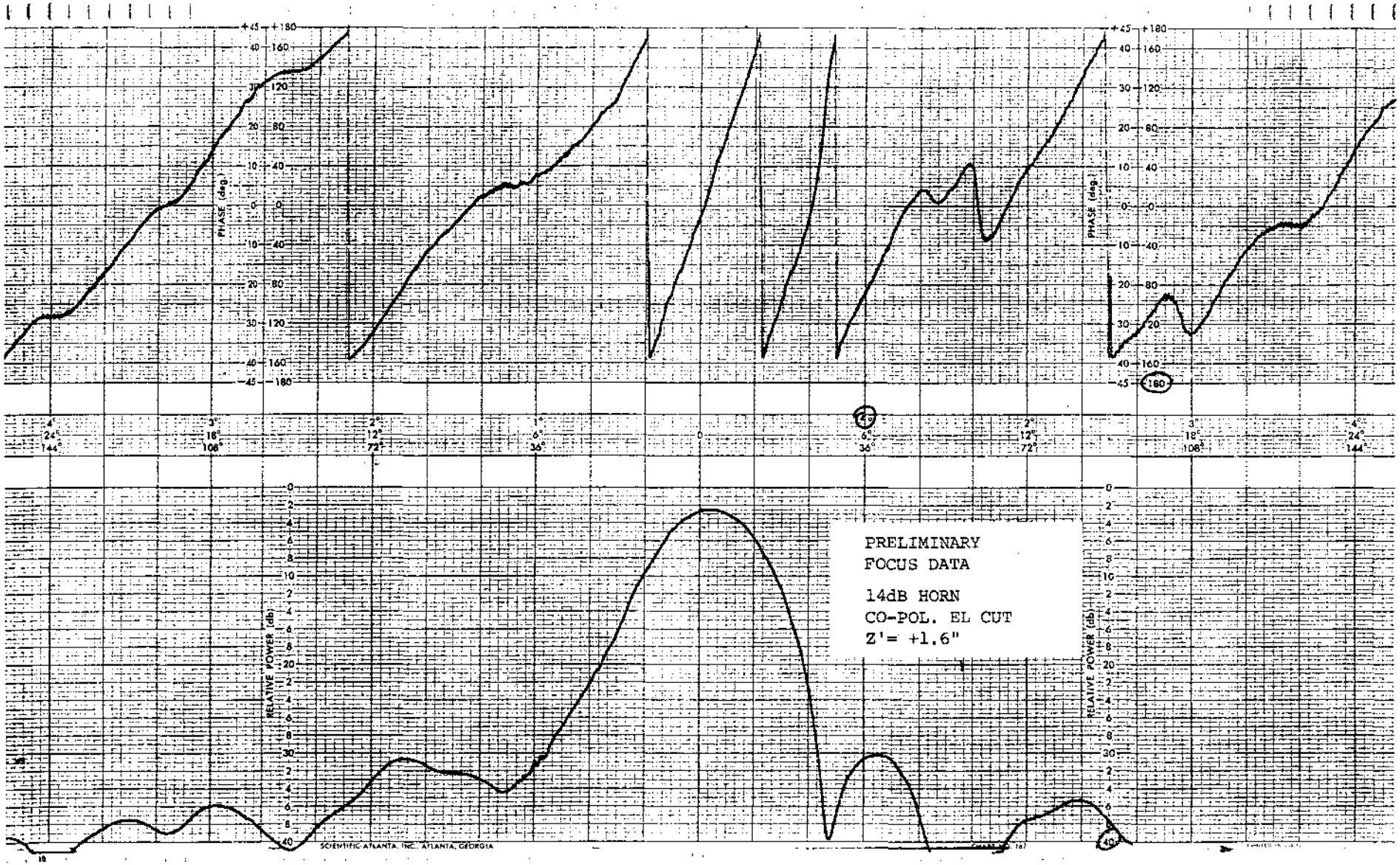

PRELIMINARY
FOCUS DATA
14dB HORN
CO-POL. AZ CUT
Z'= +0.8"
PHASE (deg.)
RELATIVE POWER (db)

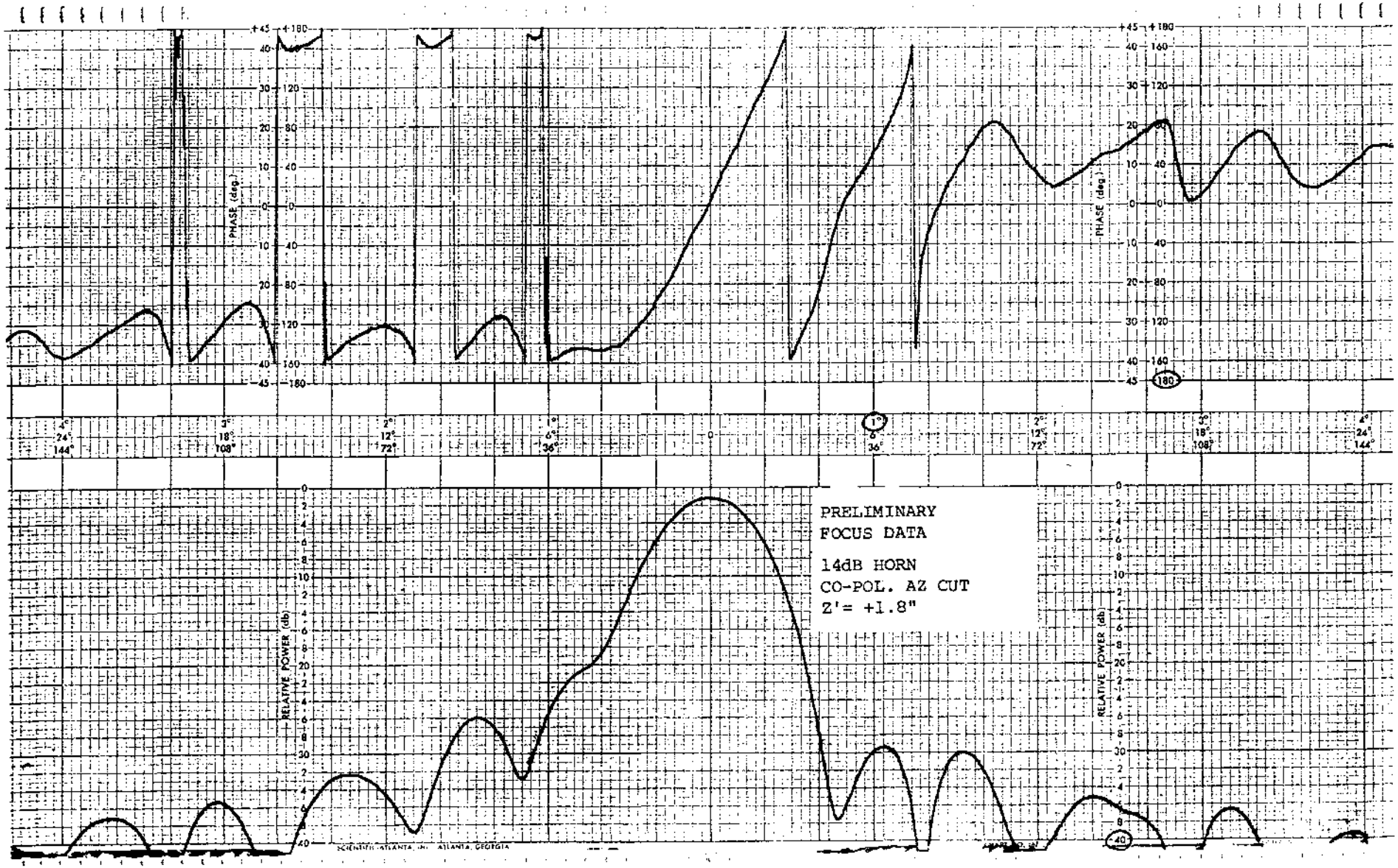

PRELIMINARY
FOCUS DATA
14dB HORN
CO-POL. EL CUT
Z'= +0.8"
PHASE (deg)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

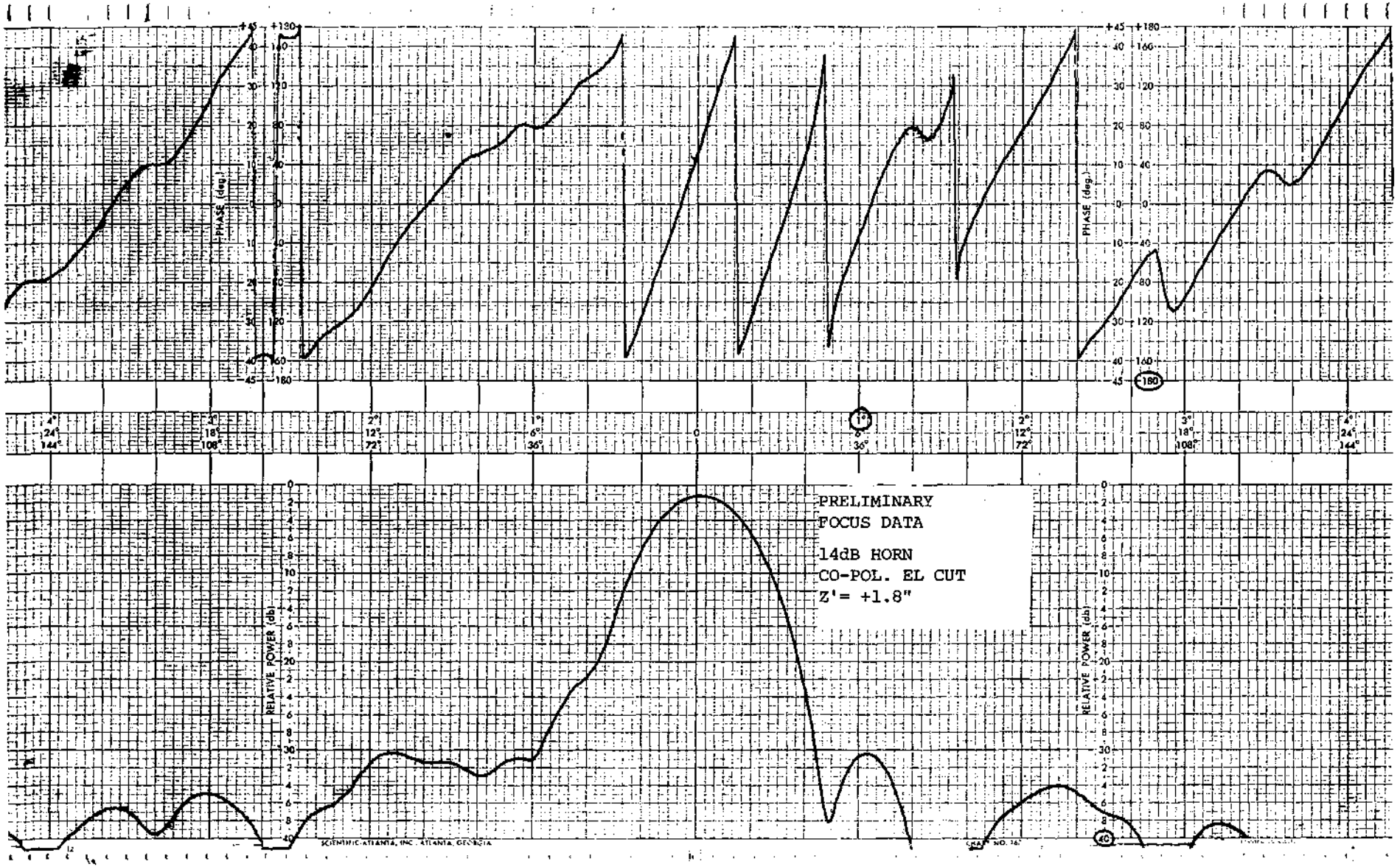

PHASE (deg)
RELATIVE POWER (db)
PRELIMINARY
FOCUS DATA
14dB HORN
CO-POL. AZ CUT
Z'= +1.2"
SCIENTIFIC ATLANTA, INC. ATLANTA GEORGIA

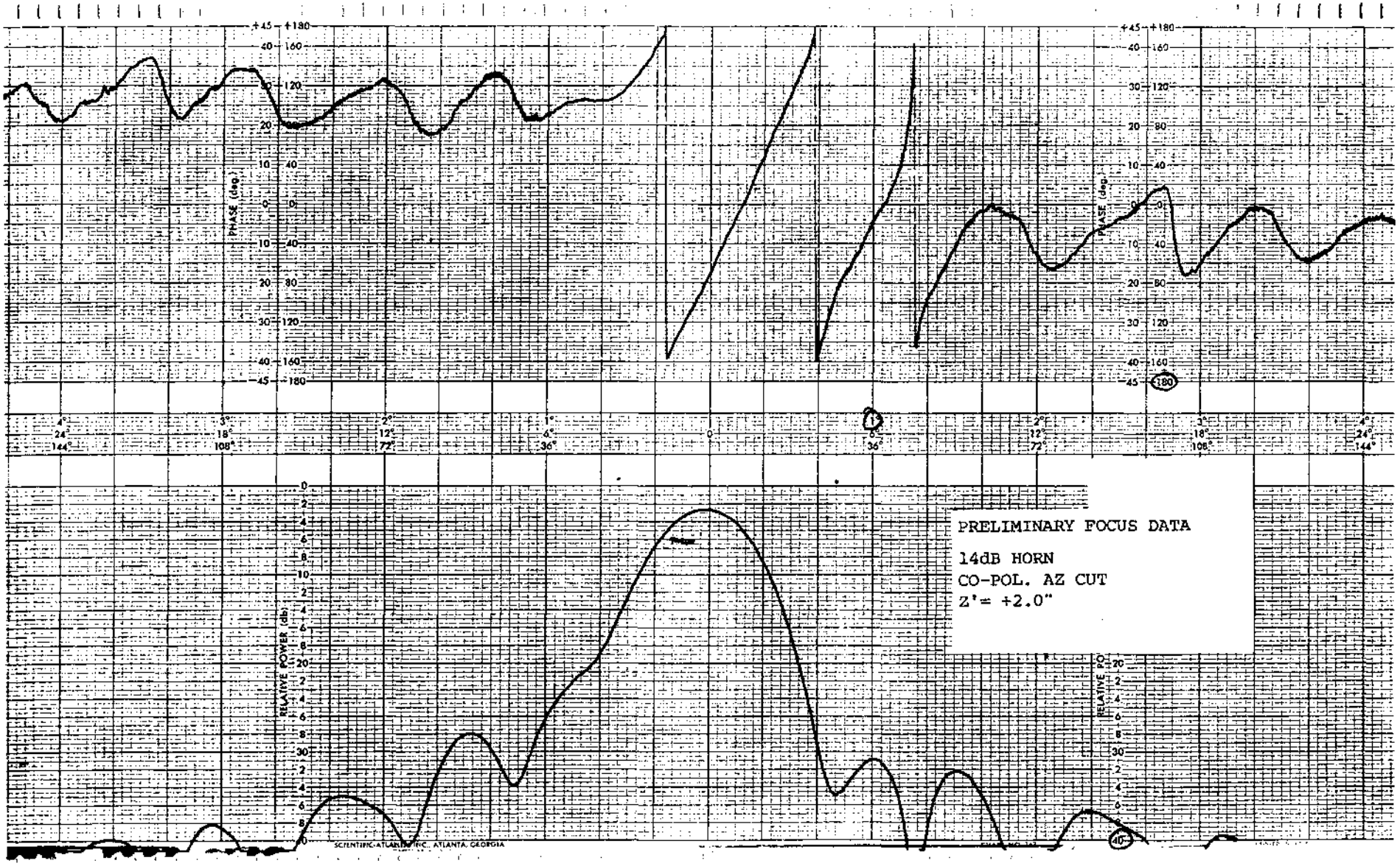

PRELIMINARY
FOCUS DATA
14dB HORN
CO-POL. EL CUT
Z'= +1.2"
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

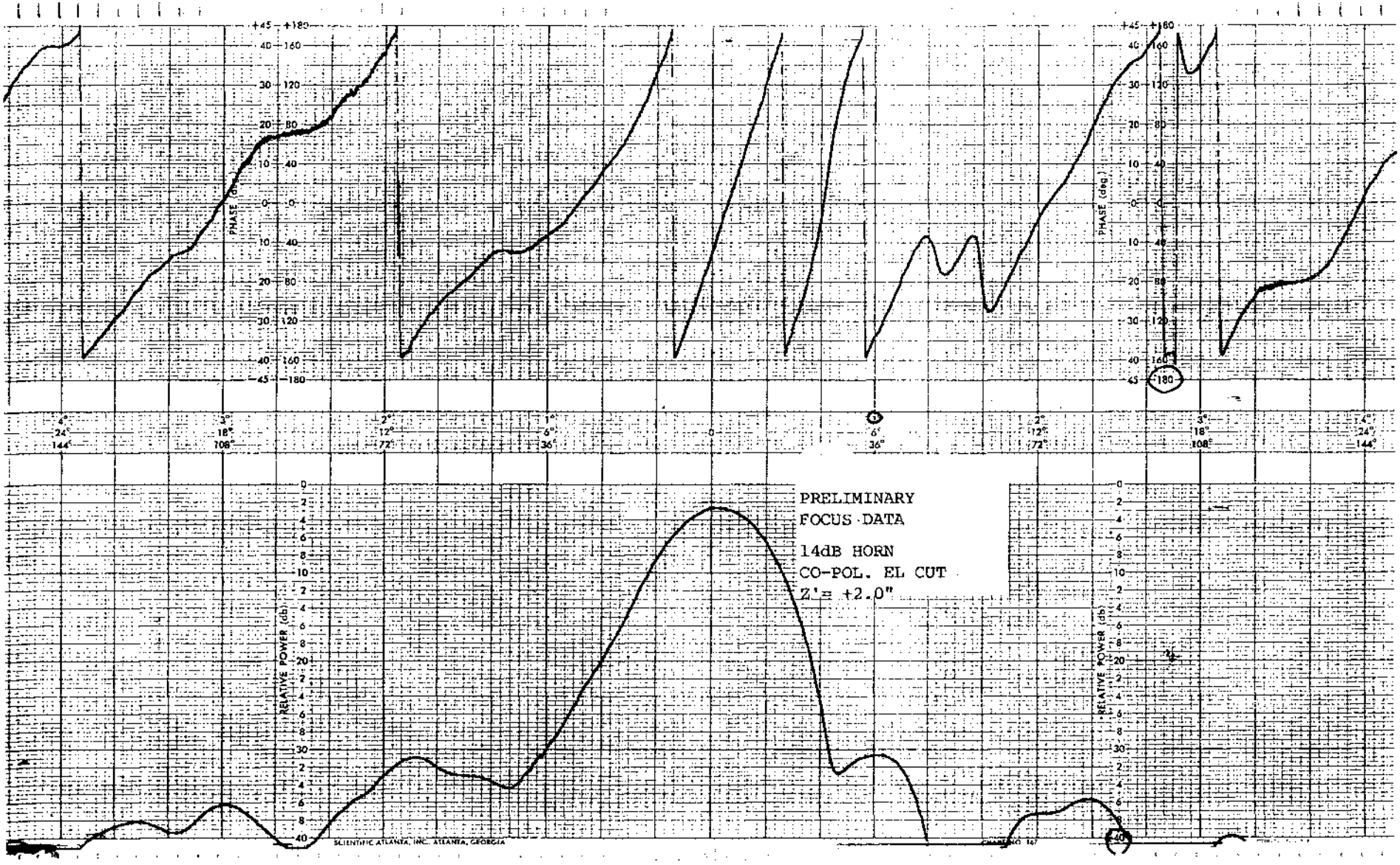

PRELIMINARY
FOCUS DATA
14dB HORN
CO-POL. AZ CUT
Z'= +1.6"
PHASE (deg.)
RELATIVE POWER (db)


PHASE (deg.)
RELATIVE POWER (db)
PRELIMINARY
FOCUS DATA
14dB HORN
CO-POL. EL CUT
Z'= +1.6"
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA


PHASE (deg.)
RELATIVE POWER (db)
PRELIMINARY
FOCUS DATA
14dB HORN
CO-POL. AZ CUT
Z'= +1.8"
SCIENTIFIC-ATLANTA, INC. ATLANTA, GEORGIA

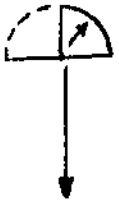
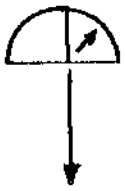
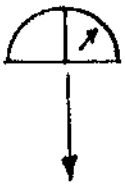

PHASE (deg.)
PHASE (deg.)
RELATIVE POWER (db)
RELATIVE POWER (db)
PRELIMINARY
FOCUS DATA
14dB HORN
CO-POL. EL CUT
Z'= +1.8"
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA


PHASE (deg.)
PHASE (deg.)
RELATIVE POWER (db)
RELATIVE PO
PRELIMINARY FOCUS DATA
14dB HORN
CO-POL. AZ CUT
Z'= +2.0"
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA


PRELIMINARY
FOCUS DATA
14dB HORN
CO-POL. EL CUT
Z'= +2.0"
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC ATLANTA, INC. ATLANTA, GEORGIA

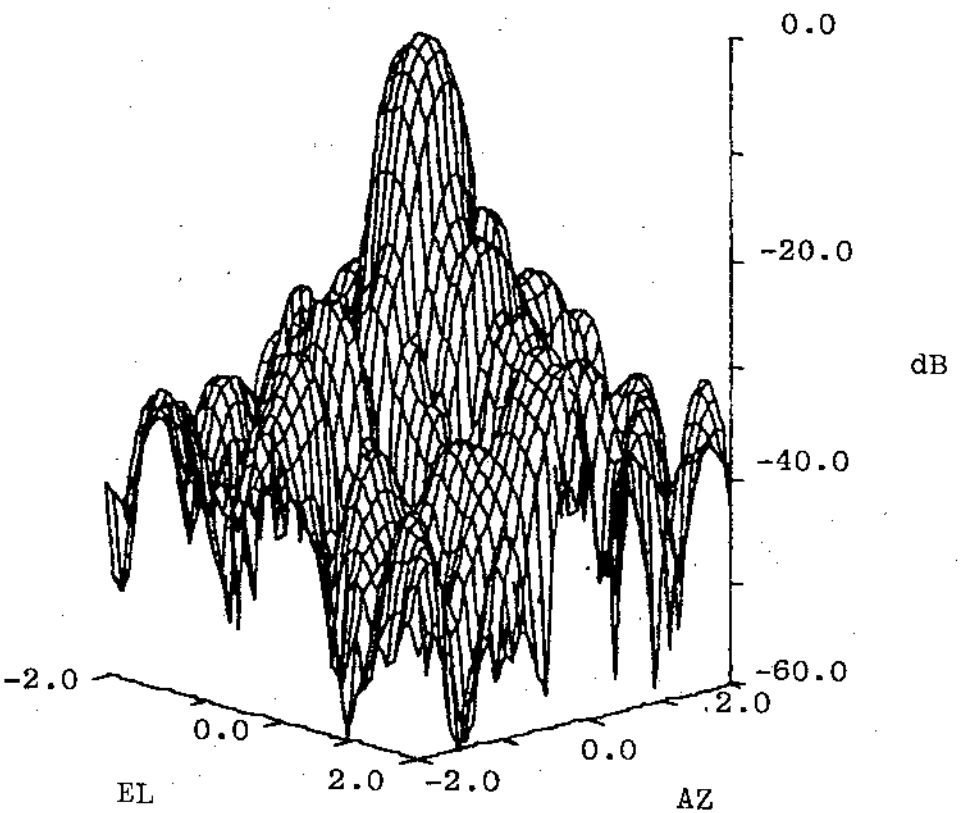
LSST - III

RASTER SCAN LOG

CONFIG.	HORN	SCAN	POL.	PK. GAIN	AZIMUTH	ELEVATION	FILE NAME	PAGE NO.
	6 dB	0.0"	CO	50.75	$\pm2^{o}$	$\pm2^{o}$	RAST 07	59 - 61
	6 dB	0.0"	X	-	$\pm2^{o}$	$\pm2^{o}$	RAST 08	62 - 64
	6 dB	4.5"	CO	50.55	$\pm2^{o}$	$\pm2^{o}$	RAST 09	65 - 67
	6 dB	4.5"	X	-	$\pm2^{o}$	$\pm2^{o}$	RAST 10	68 - 70
	6 dB	0.0"	CO	50.75	-6^{o} to $+2^{o}$	$\pm2^{o}$	RAST 17	71 - 73
	6 dB	0.0"	X	-	-6^{o} to $+2^{o}$	$\pm2^{o}$	RAST 18	74 - 76
	6 dB	4.5"	CO	50.45	-6^{o} to $+2^{o}$	$\pm2^{o}$	RAST 15	77 - 79
	6 dB	4.5"	X	-	-6^{o} to $+2^{o}$	$\pm2^{o}$	RAST 16	80 - 82
	6 dB	0.0"	CO		-6^{o} to $+2^{o}$	$\pm2^{o}$	RAST 35	83 - 85
	14 dB	0.0"	CO	50.52	$\pm2^{o}$	$\pm2^{o}$	RAST 01	86 - 88
	14 dB	0.0"	X	-	$\pm2^{o}$	$\pm2^{o}$	RAST 02	89 - 91
	14 dB	4.5"	CO	50.35	$\pm2^{o}$	$\pm2^{o}$	RAST 05	92 - 94
	14 dB	4.5"	X	-	$\pm2^{o}$	$\pm2^{o}$	RAST 06	95 - 97
	14 dB	6.5"	CO	50.05	$\pm2^{o}$	$\pm2^{o}$	RAST 03	98 - 100
	14 dB	6.5"	X	-	$\pm2^{o}$	$\pm2^{o}$	RAST 04	101 - 103
	14 dB	0.0"	CO	50.39	-6^{o} to $+2^{o}$	$\pm2^{o}$	RAST 11	104 - 106
	14 dB	0.0"	X	-	-6^{o} to $+2^{o}$	$\pm2^{o}$	RAST 12	107 - 109
	14 dB	4.5"	CO	50.00	-6^{o} to $+2^{o}$	$\pm2^{o}$	RAST 13	110 - 112
	14 dB	4.5"	X	-	-6^{o} to $+2^{o}$	$\pm2^{o}$	RAST 14	113 - 115
	14 dB	0.0"	CO	50.55	-6^{o} to $+2^{o}$	$\pm2^{o}$	RAST 36	116 - 118

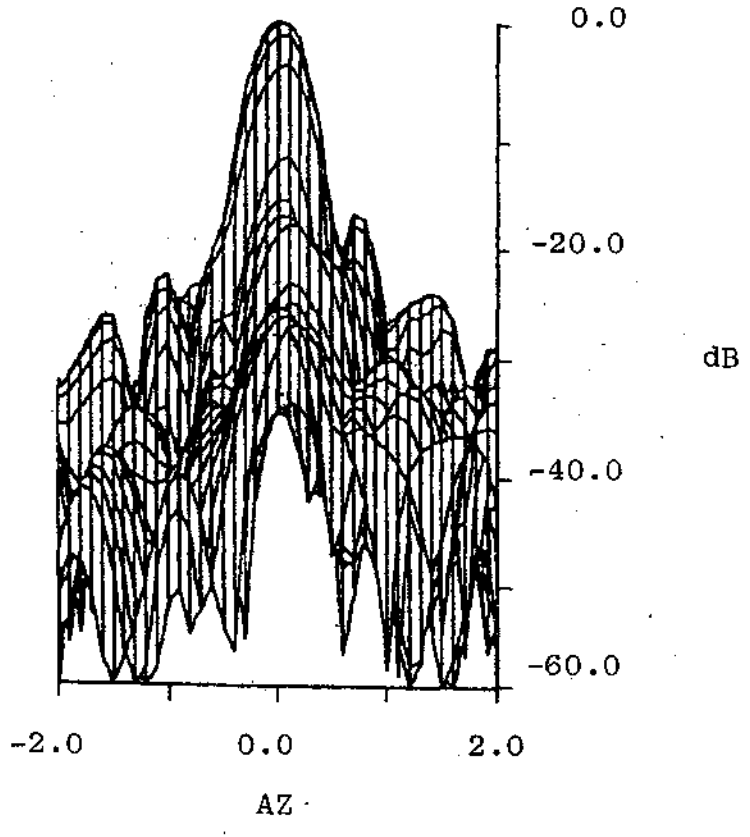
YHIGH= -1.9000
YLOW=-71.3000
CEILING= 0.0000
FLOOR=-60.0000

6 dB HORN
Scan: 0.0"
Co-Pol RASTER 07



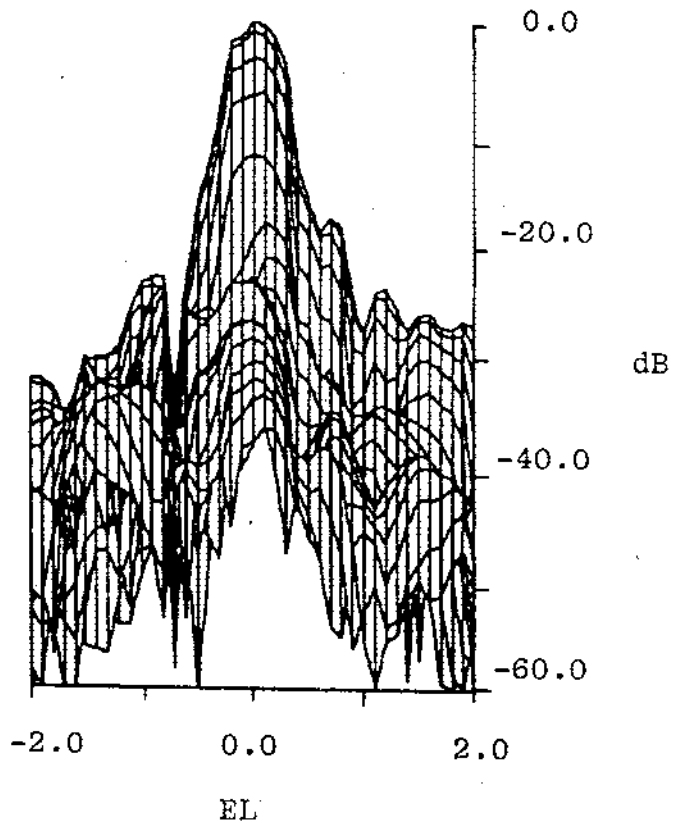
YHIGH= -1.9000
YLOW=-71.3000
CEILING= 0.0000
FLOOR=-60.0000

6 dB HORN
Scan: 0.0"
Co-Pol RASTER 07



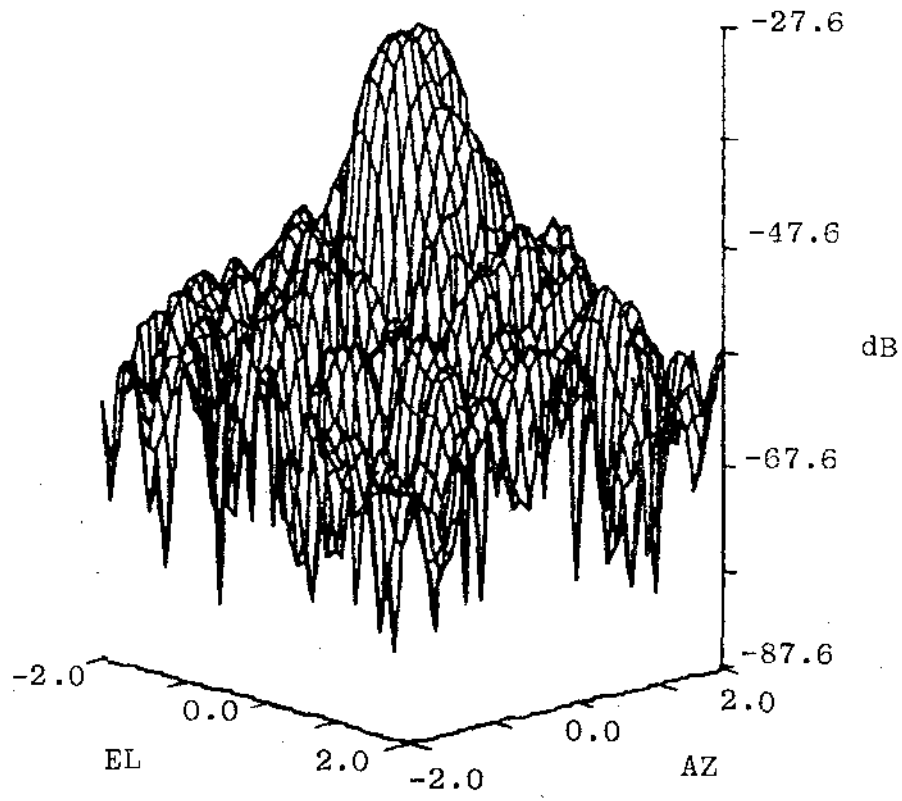
YHIGH= -1.9000
YLOW=-71.3000
CEILING= 0.0000
FLOOR=-60.0000

6 dB HORN
Scan: 0.0"
Co-Pol RASTER 07



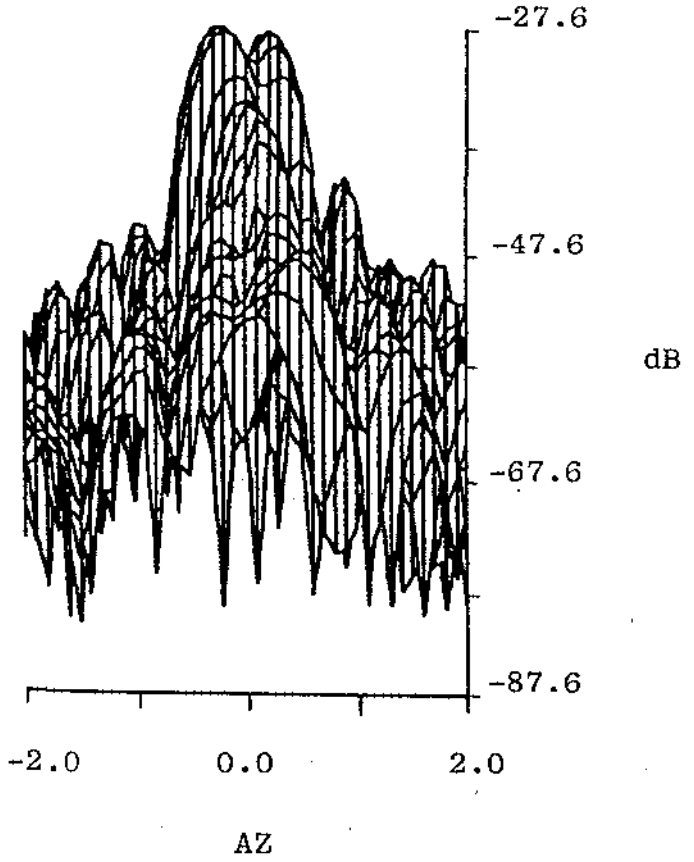
VHIGH=-29.5000
VLOW=-82.9000
CEILING=-20.0000
FLOOR=-90.0000

6 dB · HORN
Scan: 0.0"
X-Pol RASTER 08



YHIGH=-29.5000
YLOW=-82.9000
CEILING=-20.0000
FLOOR=-80.0000

6 dB HORN
Scan: 0.0"
X-Pol RASTER 08

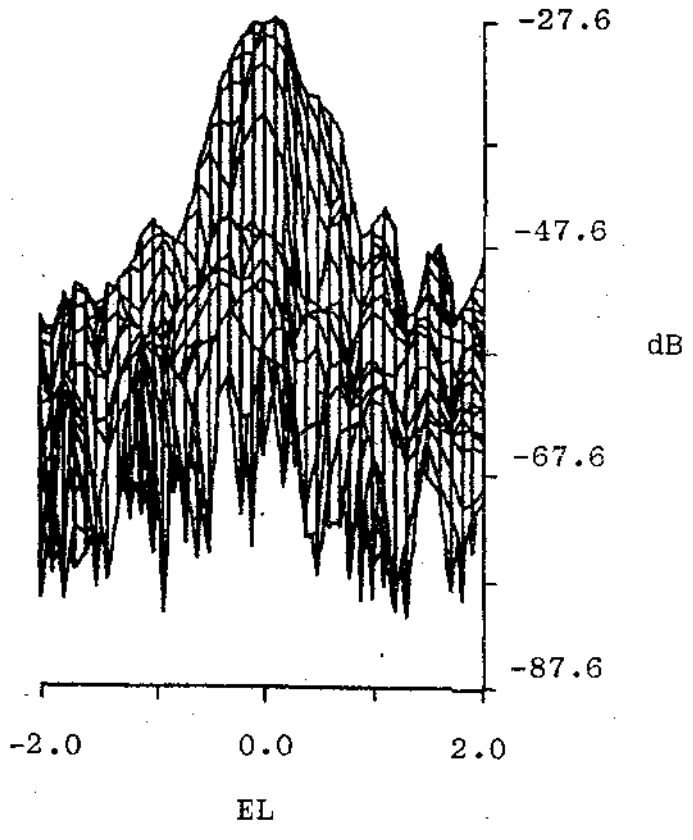


YHIGH=-29.5000
YLOW=-82.9000
CEILING=-20.0000
FLOOR=-80.0000

6 dB HORN

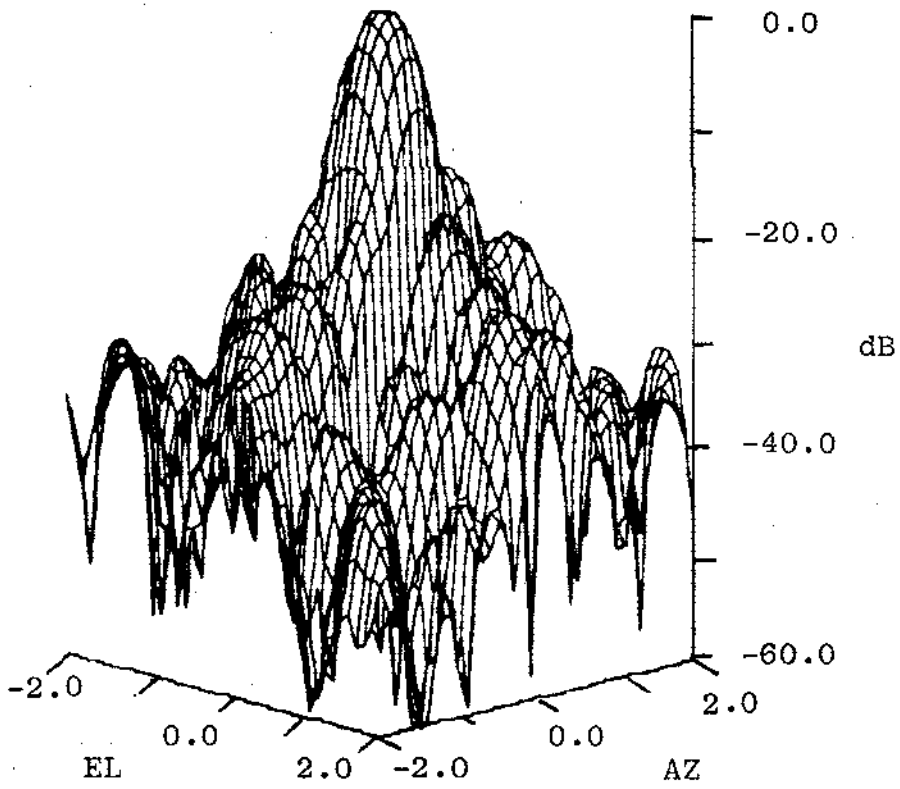
Scan: 0.0"

X-Pol RASTER 08



VHIGH= -3.4000
VLOW=-78.3000
CEILING= 0.0000
FLOOR=-60.0000

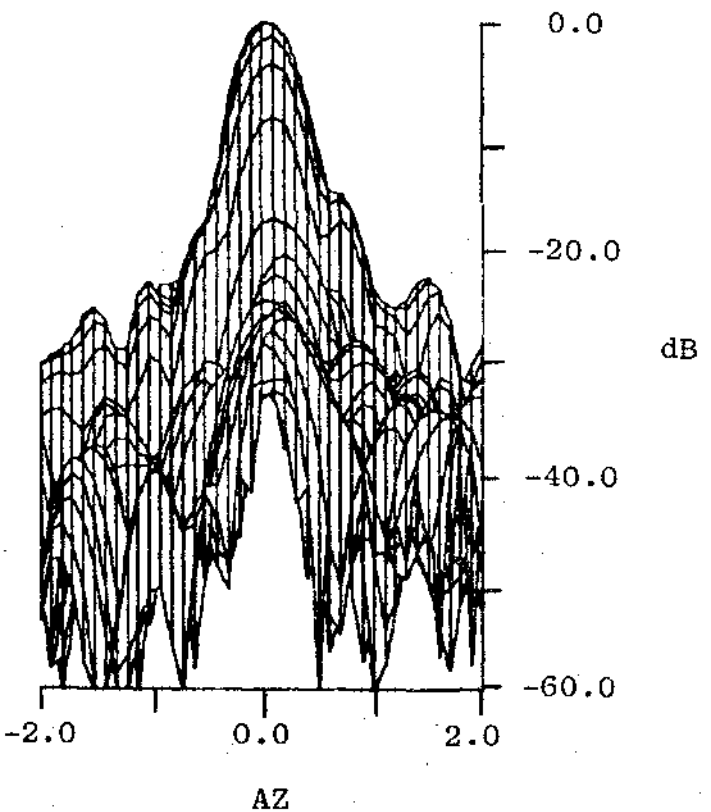
6 dB HORN
SCAN: 4.5"
Co-Pol. RASTER 0



YHIGH= -3.4000
YLOW= -78.3000
CEILING= 0.0000
FLOOR= -60.0000

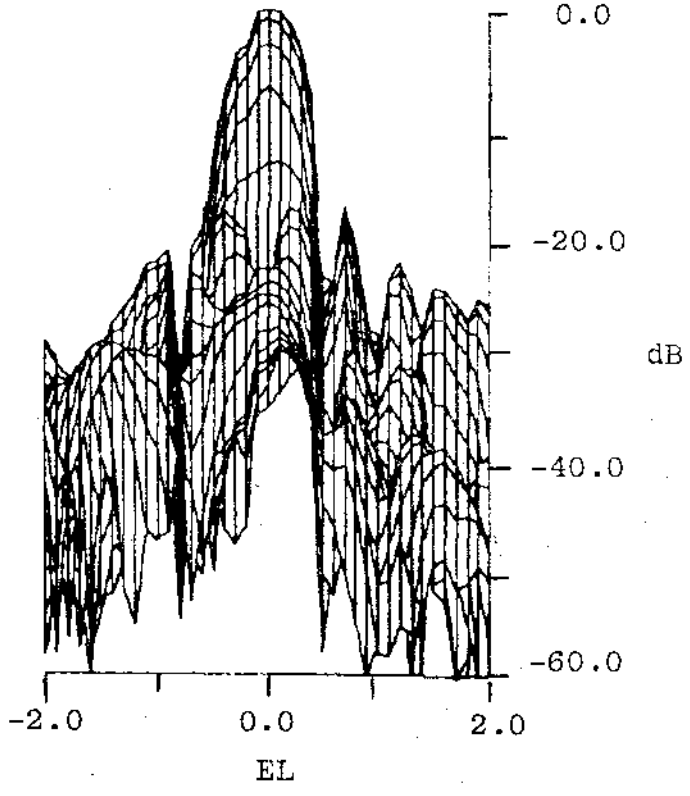
6 dB HORN
SCAN: 4.5"

Co-Pol. RASTER 09



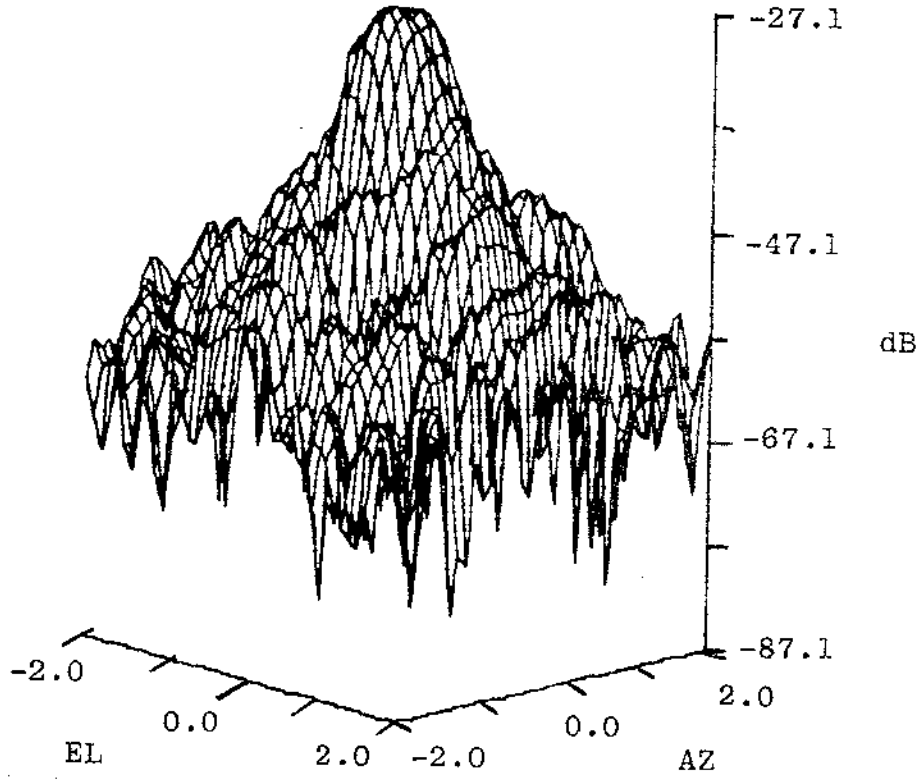
XHIGH= -3.4000
XLOW=-75.3000
CEILING= 0.0000
FLOOR=-60.0000

6 dB HORN
SCAN: 4.5"
Co-Pol. RASTER 09



VHIGH=-30.5000
VLOW=-84.5000
CEILING=-20.0000
FLOOR=-80.0000

6 dB HORN
SCAN: 4.5"
X-Pol. RASTER 10

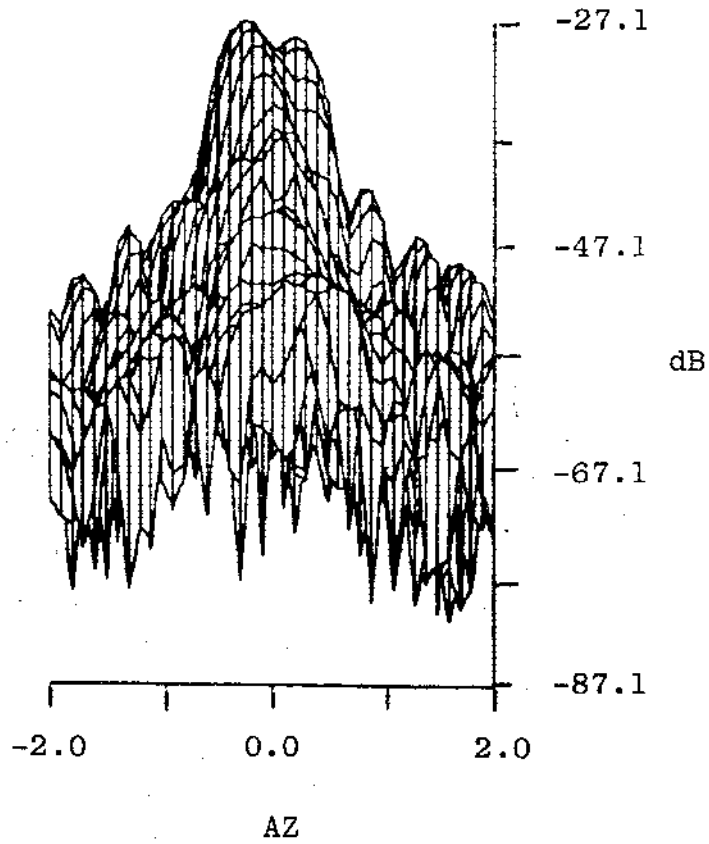


YHIGH=-30.5000
YLOW=-84.5000
CEILING=-20.0000
FLOOR=-90.0000

6 dB HORN

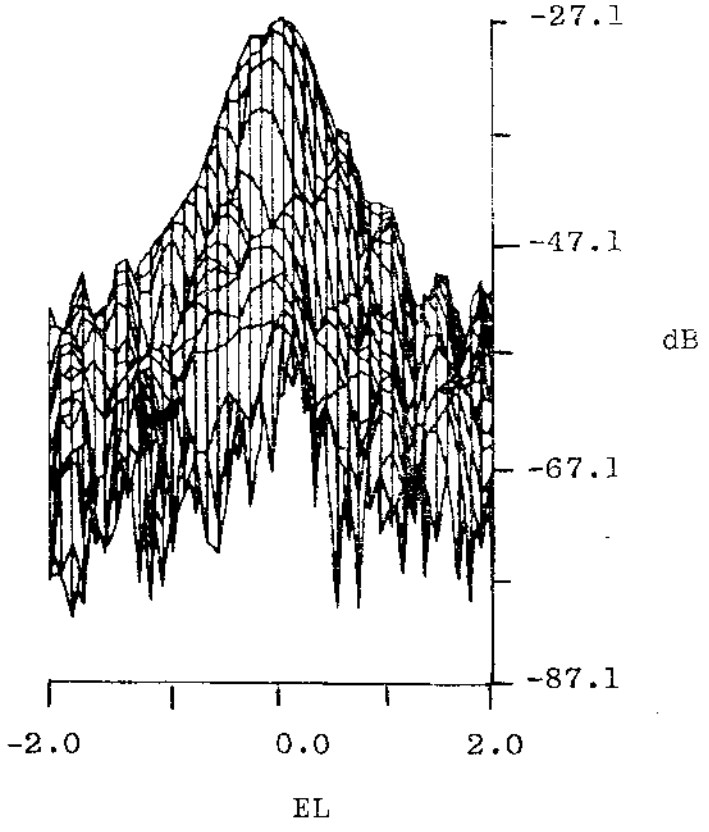
SCAN: 4.5"

X-Pol. RASTER 10



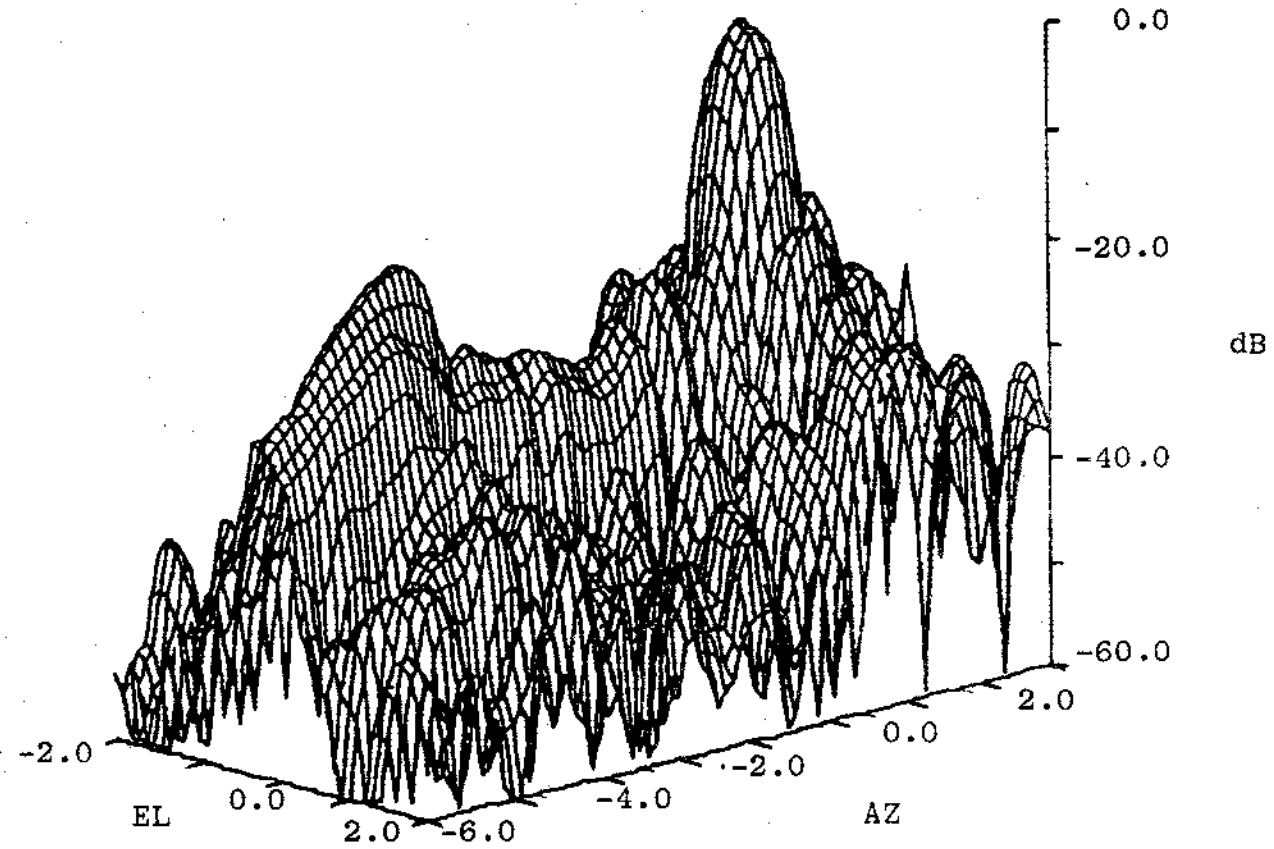
YHIGH=-30.5000
YLOW=-84.5000
CEILING=-20.0000
FLOOR=-90.0000

6 dB HORN
SCAN: 4.5"
X-Pol. RASTER 10



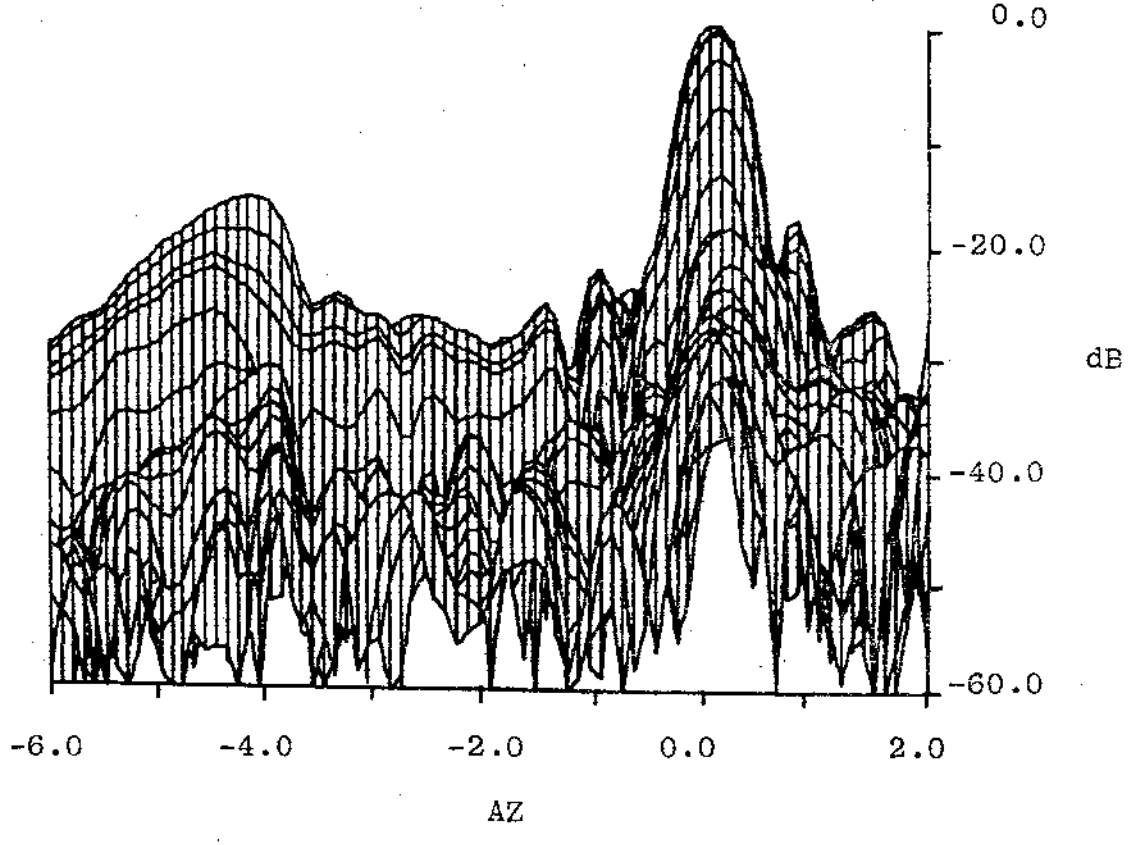
YHIGH= -3.1000
YLOW=-53.3000
CEILING= 0.0000
FLOOR=-60.0000

6 dB HORN
Scan: 0.0"
Co-Pol RASTER 17



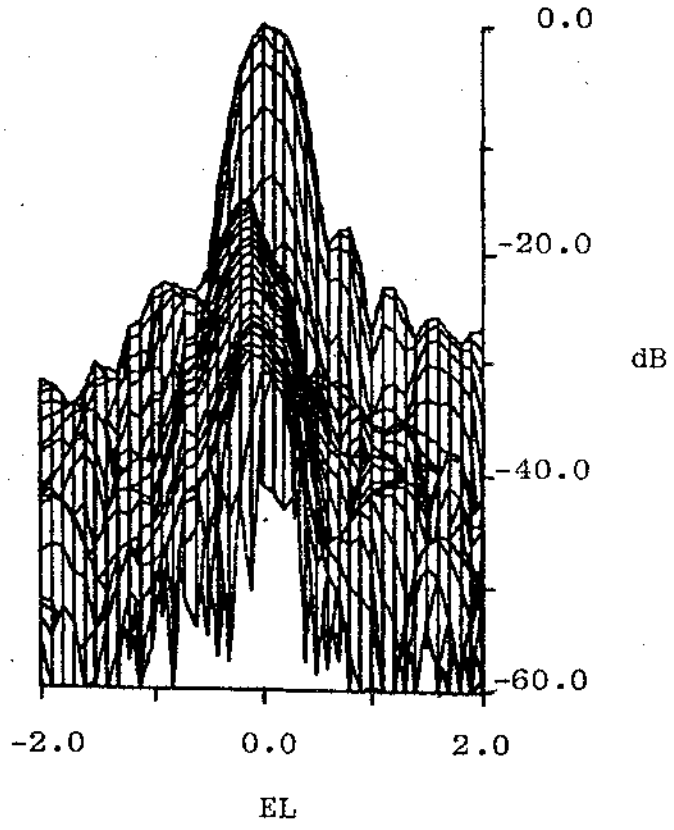
YHIGH= -3.1000
YLOW=-83.3000
CEILING= 0.0000
FLOOR=-60.0000

6 dB HORN
Scan: 0.0"
Co-Pol RASTER 17



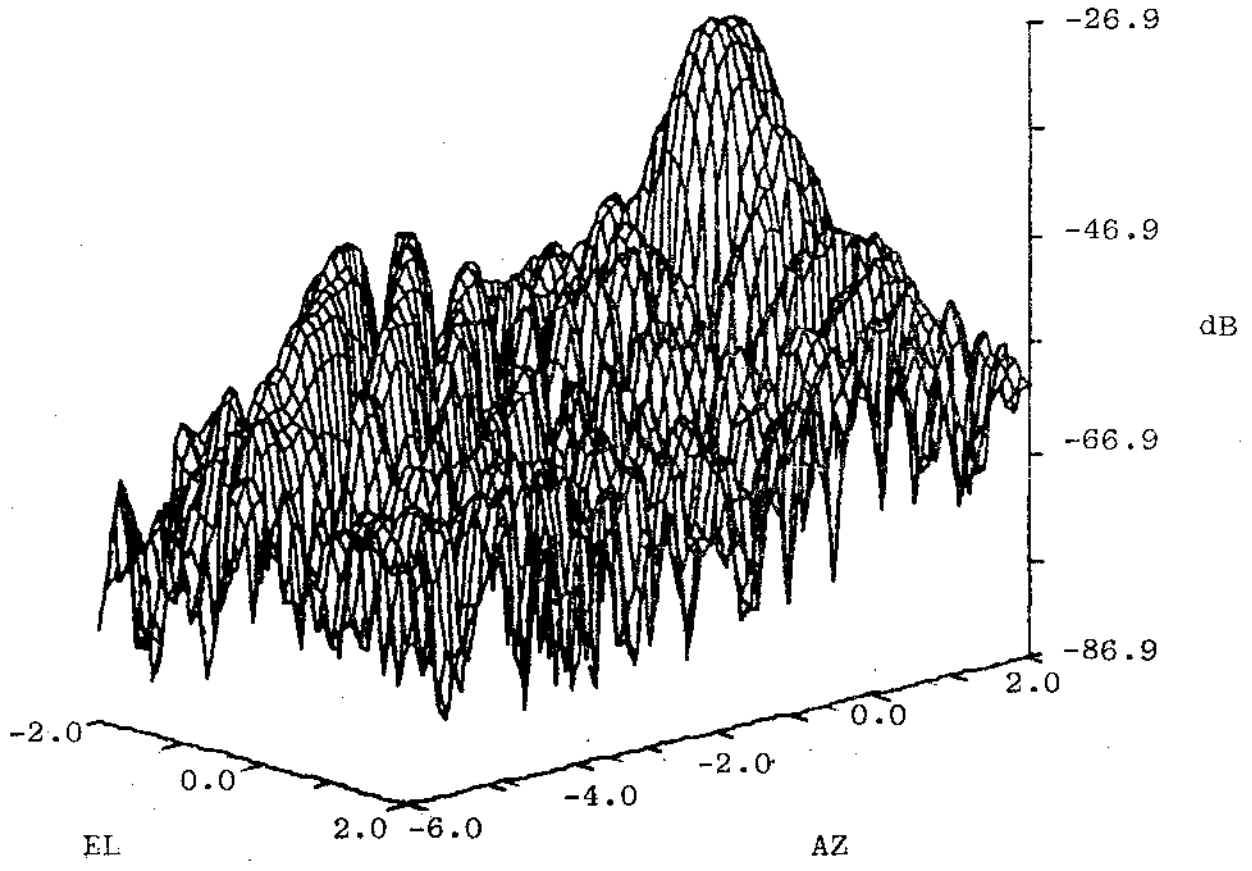
YHIGH= -3.1000
YLOW=-83.3000
CEILING= 0.0000
FLOOR=-60.0000

6 dB HORN
Scan: 0.0"
Co-Pol RASTER 17



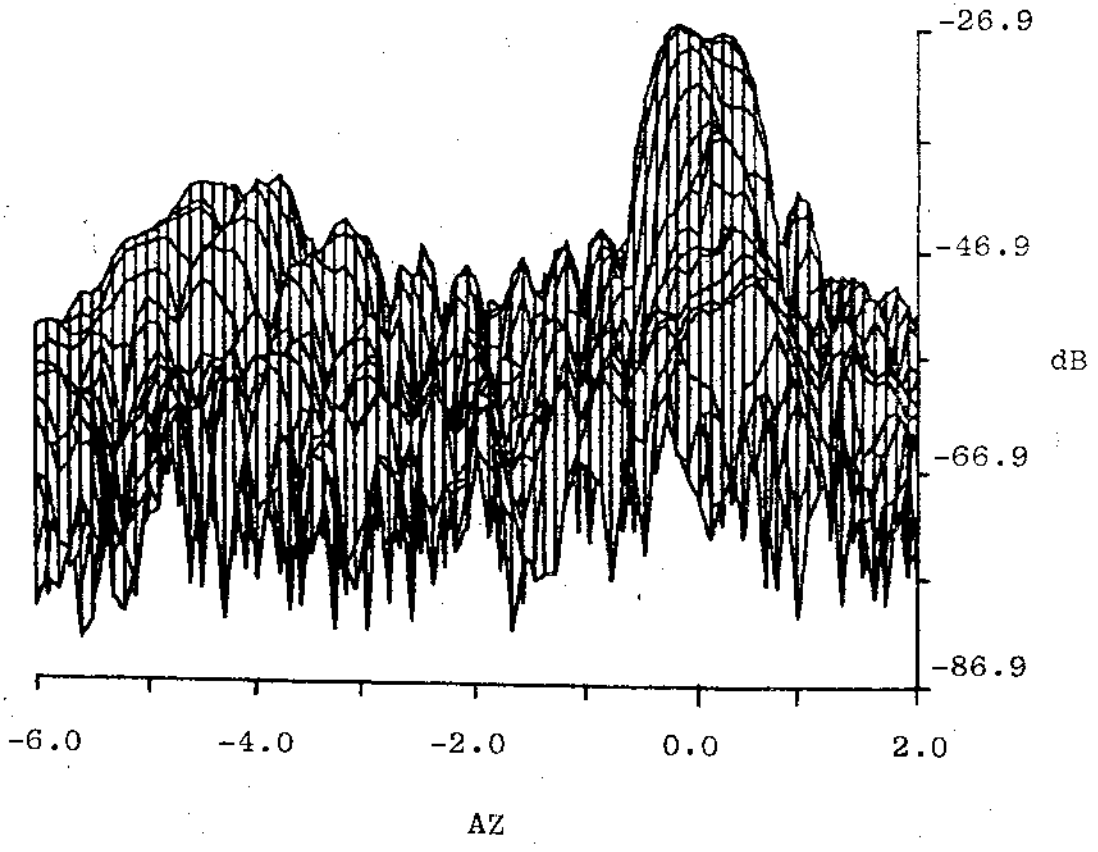
YHIGH=-30.0000
YLOW=-86.2000
CEILING=-20.0000
FLOOR=-80.0000

6 dB HORN
Scan: 0.0"
X-Pol RASTER 18



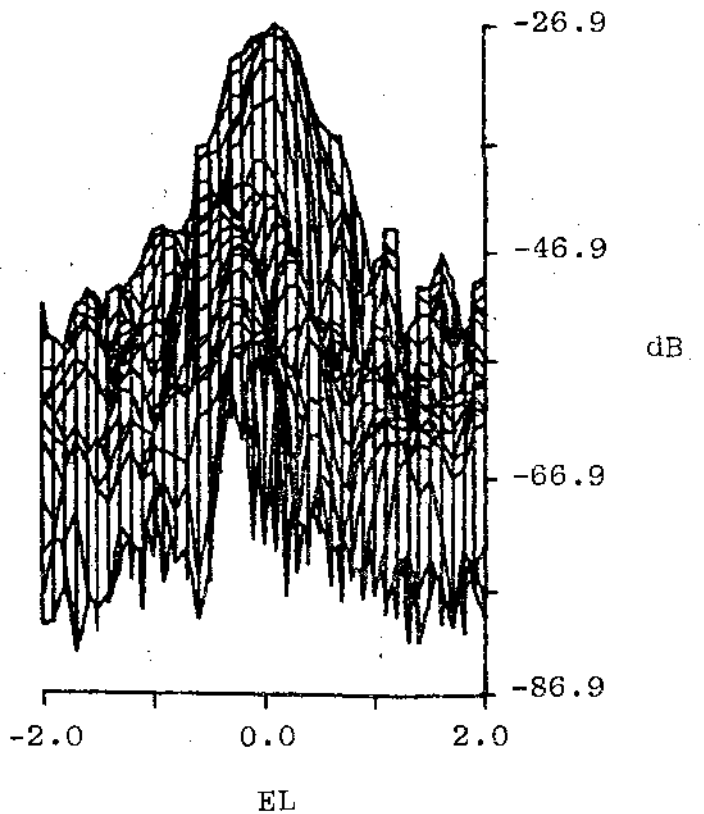
YHIGH=-30.0000
YLOW=-86.2000
CEILING=-20.0000
FLOOR=-90.0000

6 dB HORN
Scan: 0.0"
X-Pol RASTER 18

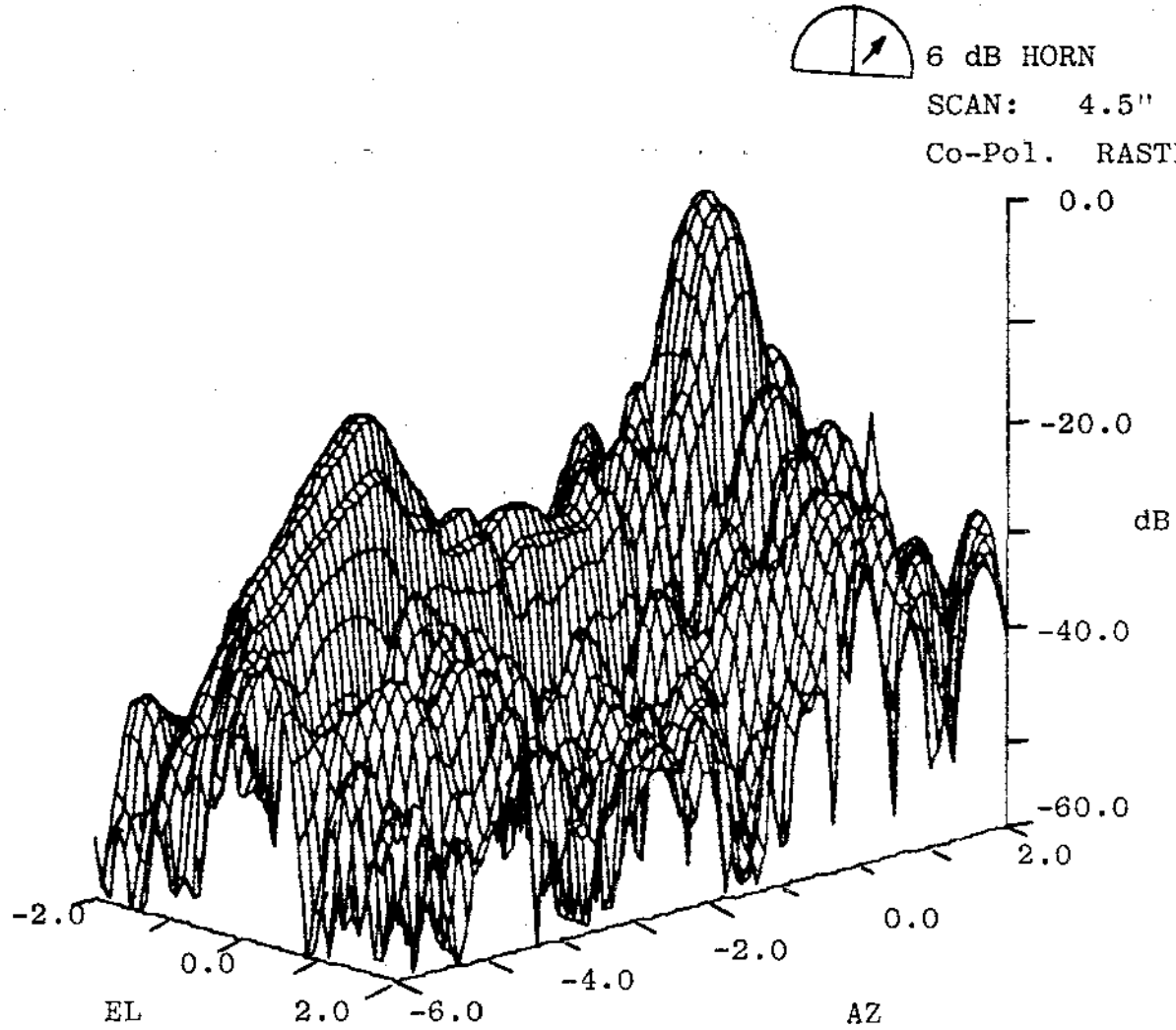


YHIGH=-30.0000
YLOW=-86.2000
CEILING=-20.0000
FLOOR=-80.0000

6 dB HORN
Scan: 0.0"
X-Pol RASTER 18

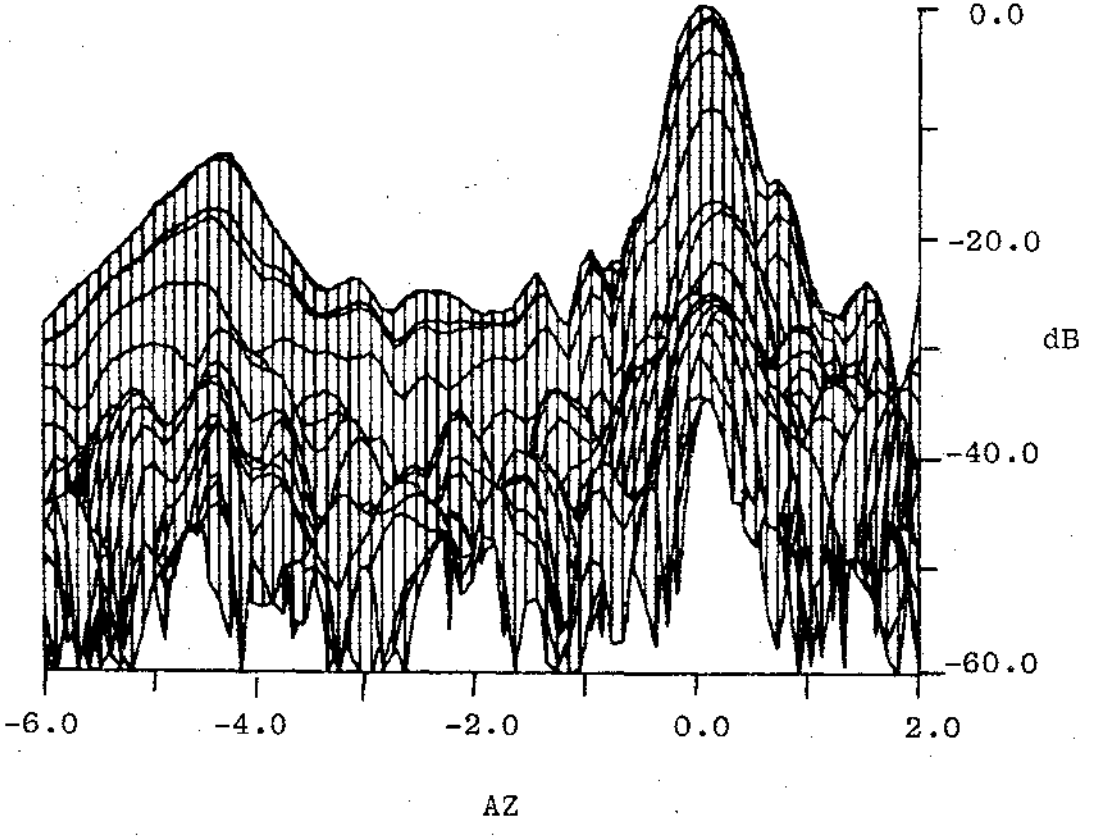


VHIGH= -3.5000
VLOW=-79.4000
CEILING= 0.0000
FLOOR=-60.0000



YHIGH= -3.5000
YLOW=-79.4000
CEILING= 0.0000
FLOOR=-60.0000

6 dB HORN
SCAN: 4.5"
Co-Pol. RASTER 15

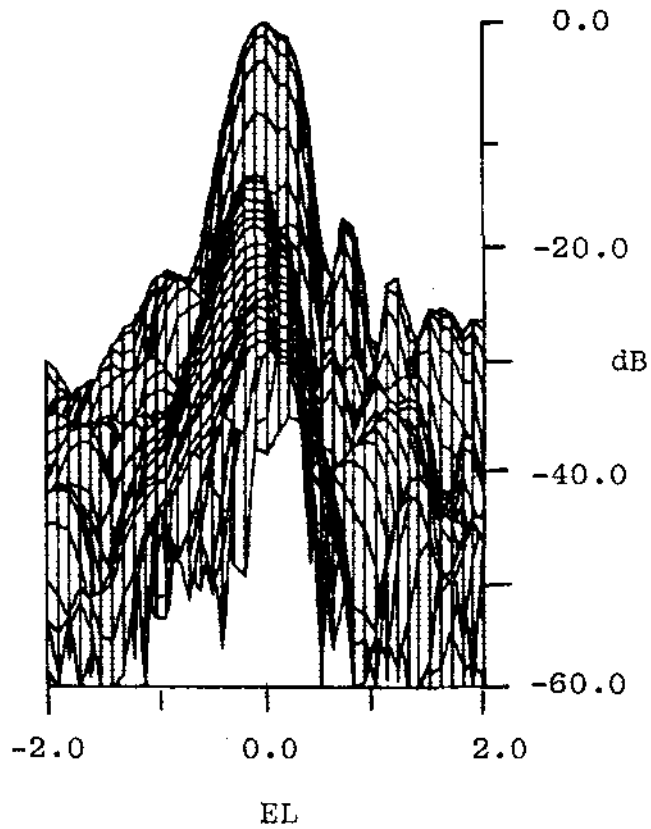


YHIGH= -3.5000
YLOW=-79.4000
CEILING= 0.0000
FLOOR=-60.0000

6 dB HORN

SCAN: 4.5"

Co-Pol. RASTER 15

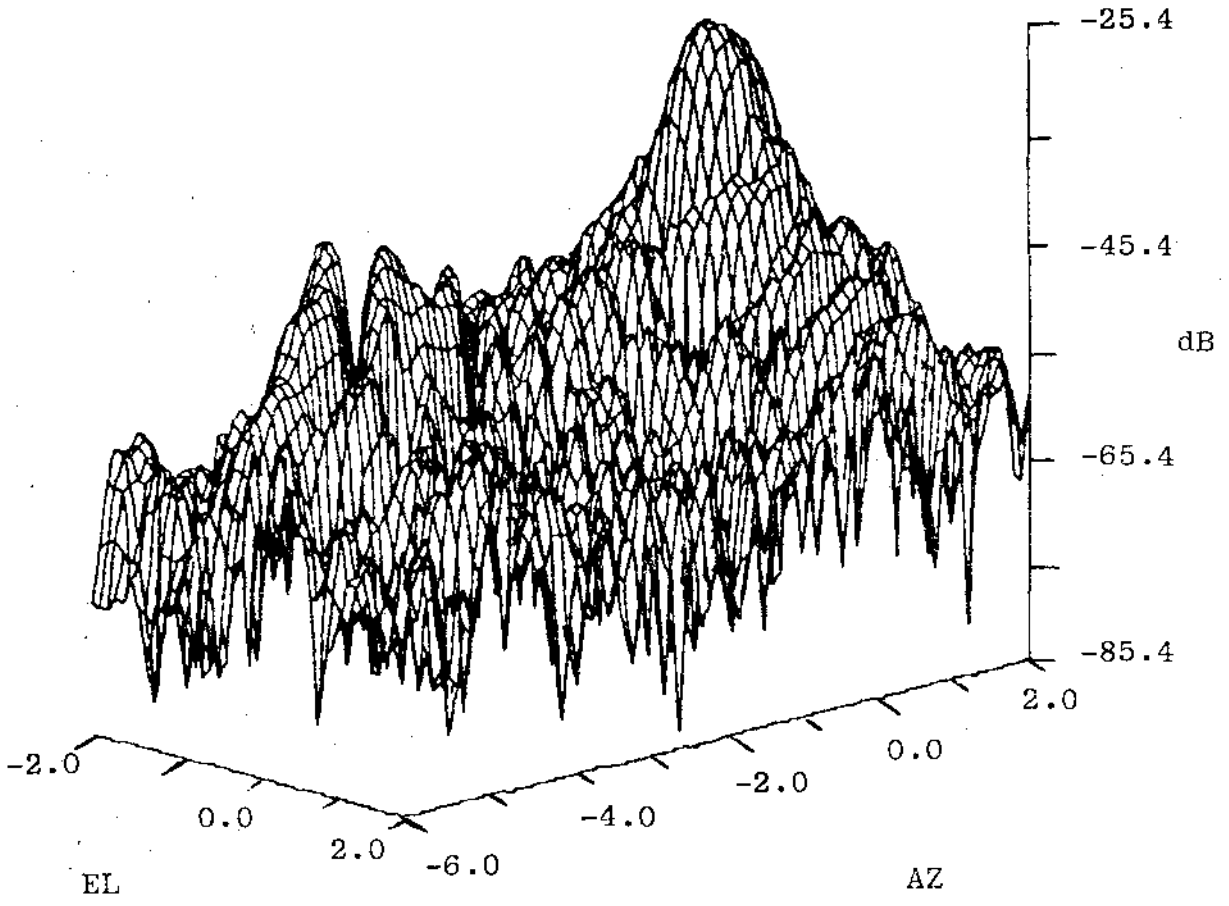


YHIGH=-25.3000
YLOW=-87.1000
CEILING=-20.0000
FLOOR=-90.0000

6 dB HORN

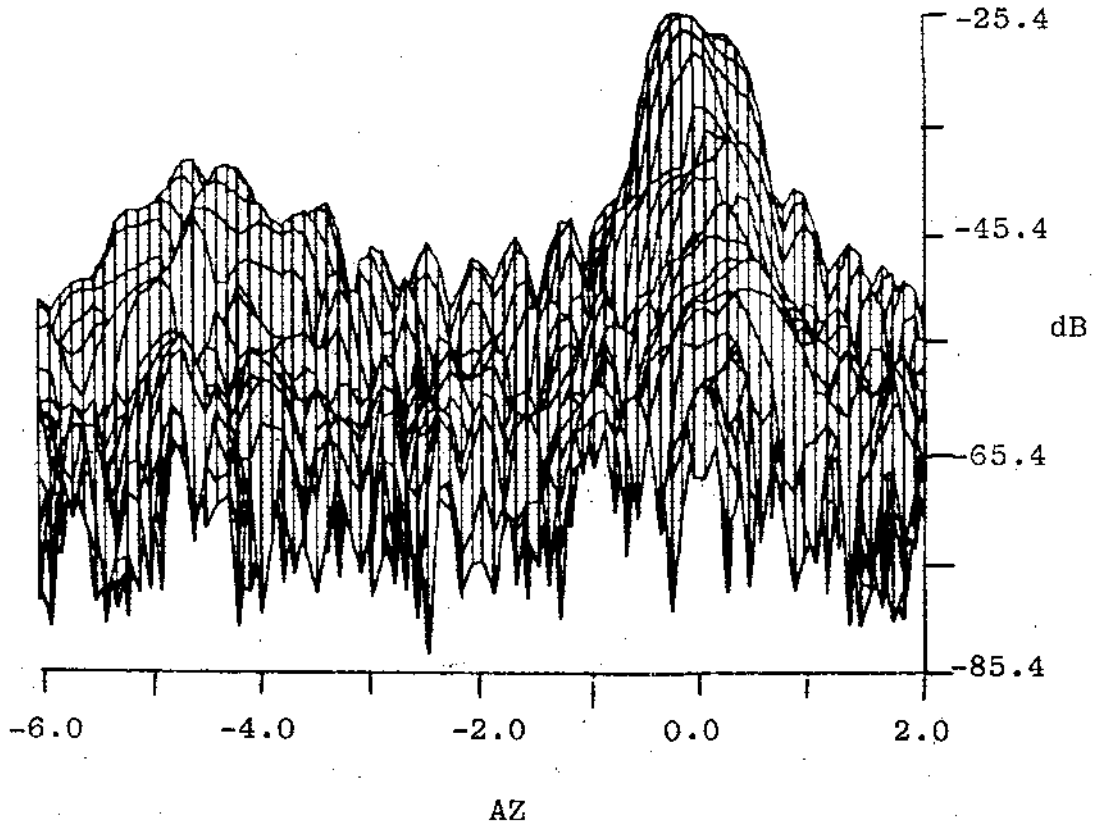
SCAN: 4.5"

X-Pol. RASTER 16



VHIGH=-25.9000
VLOW=-87.1000
CEILING=-20.0000
FLOOR=-89.0000

6 dB HORN
SCAN: 4.5"
X-Pol. RASTER 16

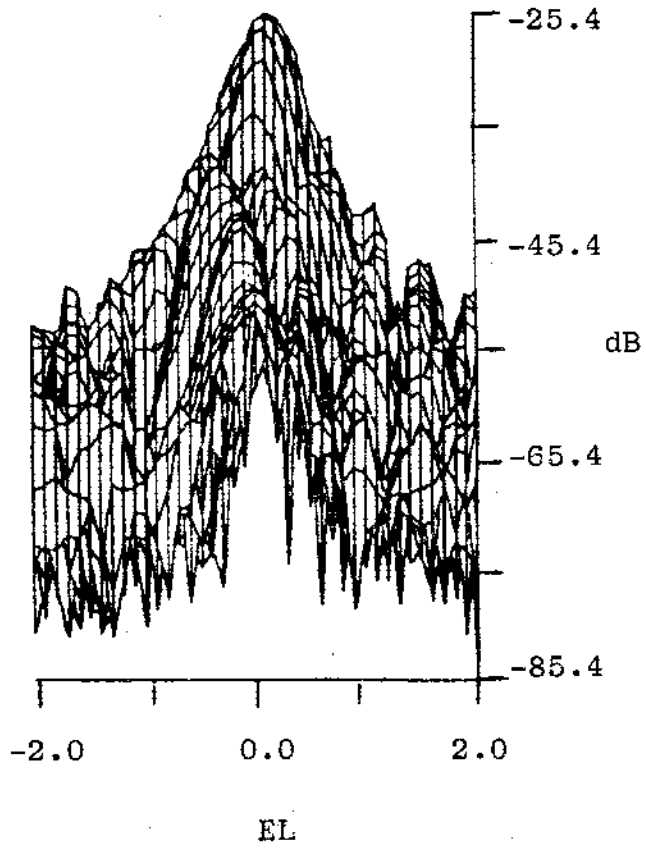


YHIGH=-25.9000
YLOW=-57.1000
CEILING=-20.0000
FLOOR=-90.0000

6 dB HORN

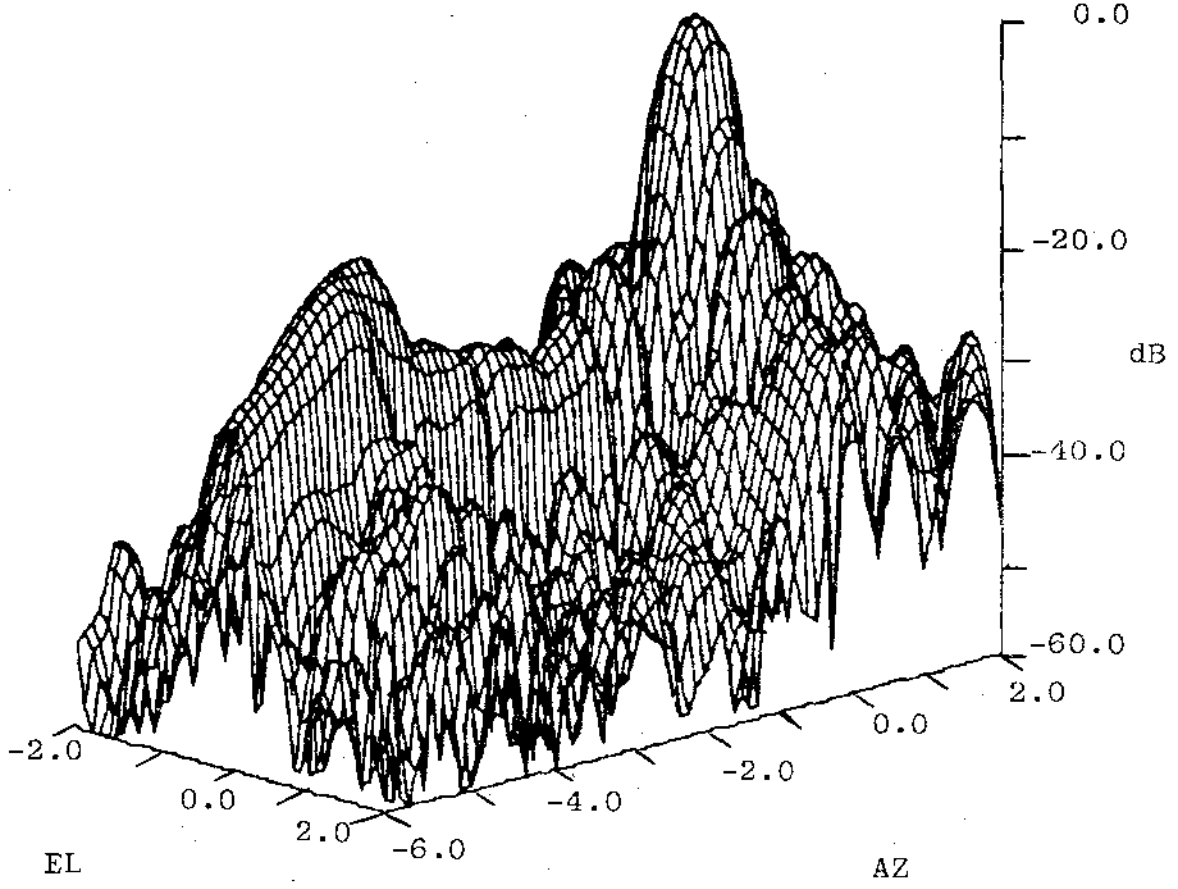
SCAN: 4.5"

X-Pol. RASTER 16



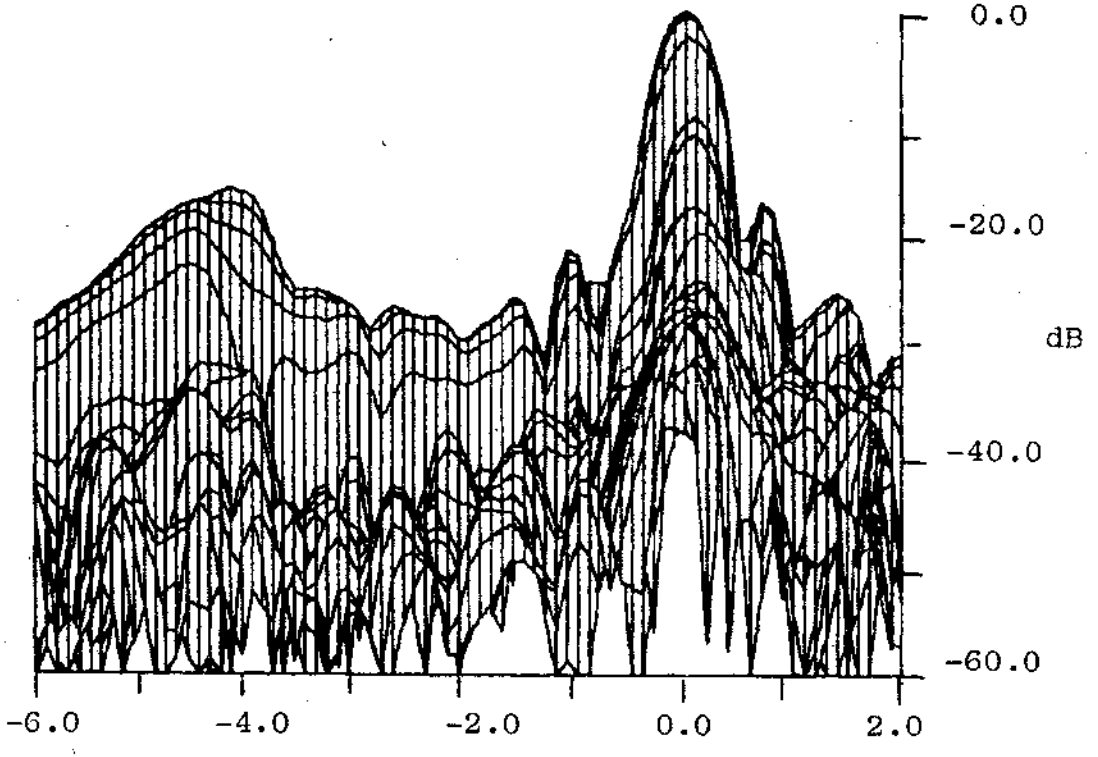
6 dB HORN
SCAN: 0.0"
Co-Pol. RASTER 35

VHIGH= -2.2000
VLOW=-80.3000
CEILING= 0.0000
FLOOR=-60.8000



VHIGH= -2.2000
VLOW=-80.3000
CEILING= 0.0000
FLOOR=-60.0000

6 dB HORN
SCAN: 0.0"
Co-Pol. RASTER 35

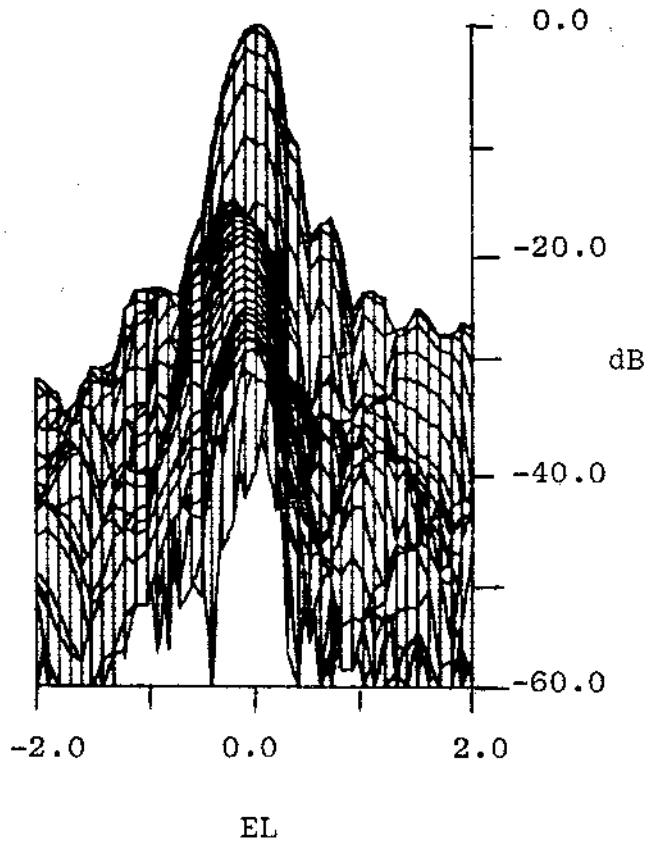


VHIGH= -2.2000
VLOW=-80.3000
CEILING= 0.0000
FLOOR=-60.0000

6 dB HORN

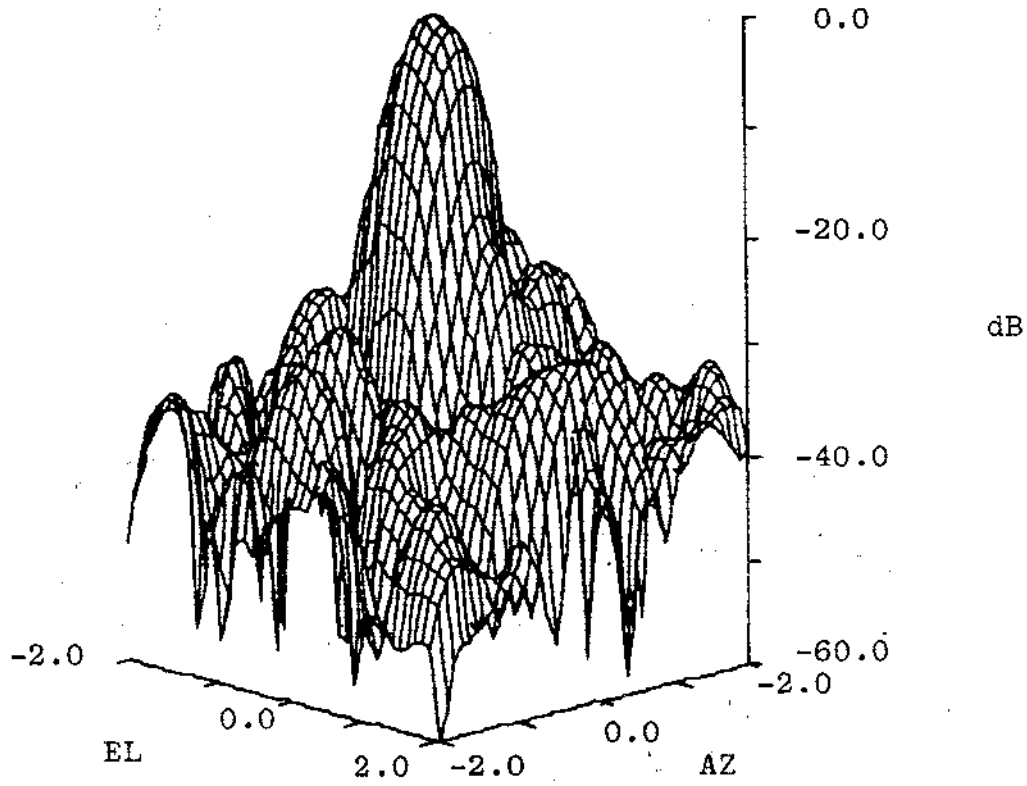
SCAN: 0.6"

Co-Pol. RASTER 35



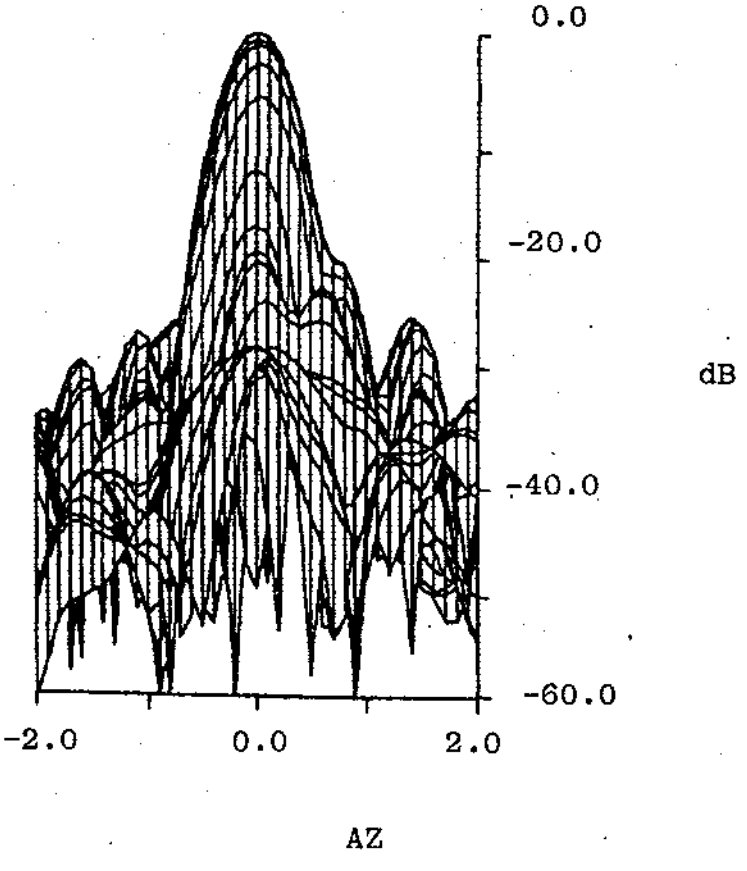
XHIGH= -2.2000
YLOW=-73.3000
CEILING= 0.0000
FLOOR=-60.0000

14 dB HORN
Scan: 0.0"
Co-Pol. RASTER 01



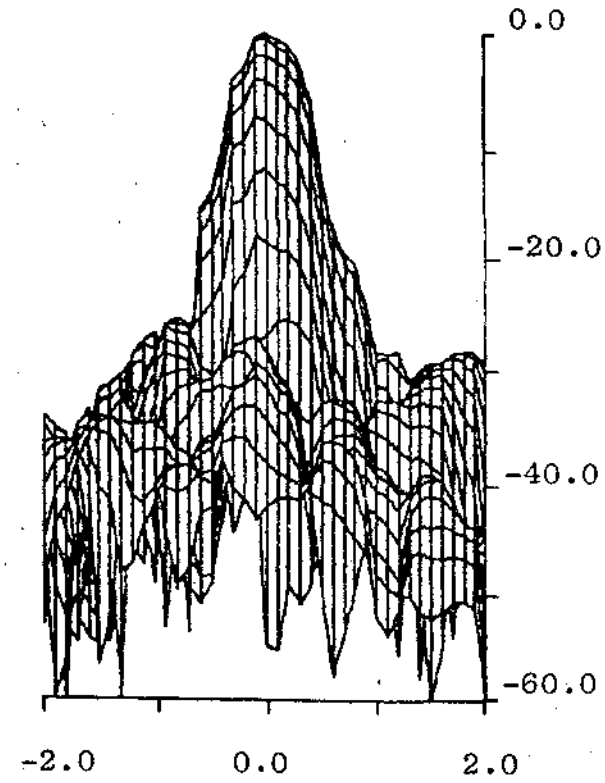
YHIGH= -2.2000
YLOW=-73.3000
CEILING= 0.0000
FLOOR=-60.0000

14 dB HORN
Scan: 0.0"
Co-Pol RASTER 01

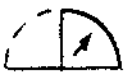


YHIGH= -2.2000
YLOW=-73.3000
CEILING= 0.0000
FLOOR=-60.0000

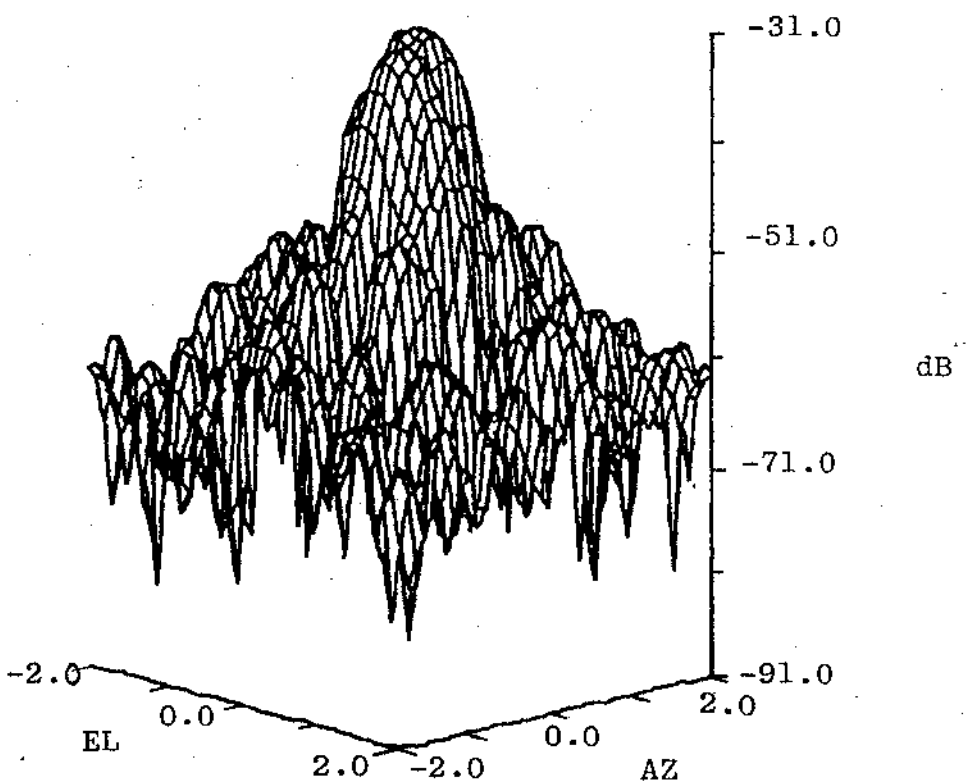
14 dB HORN
Scan: 0.0"
Co-Pol. Raster 01



YHIGH=-31.2000
YLOW=-84.4000
CEILING=-20.0000
FLOOR=-90.0000

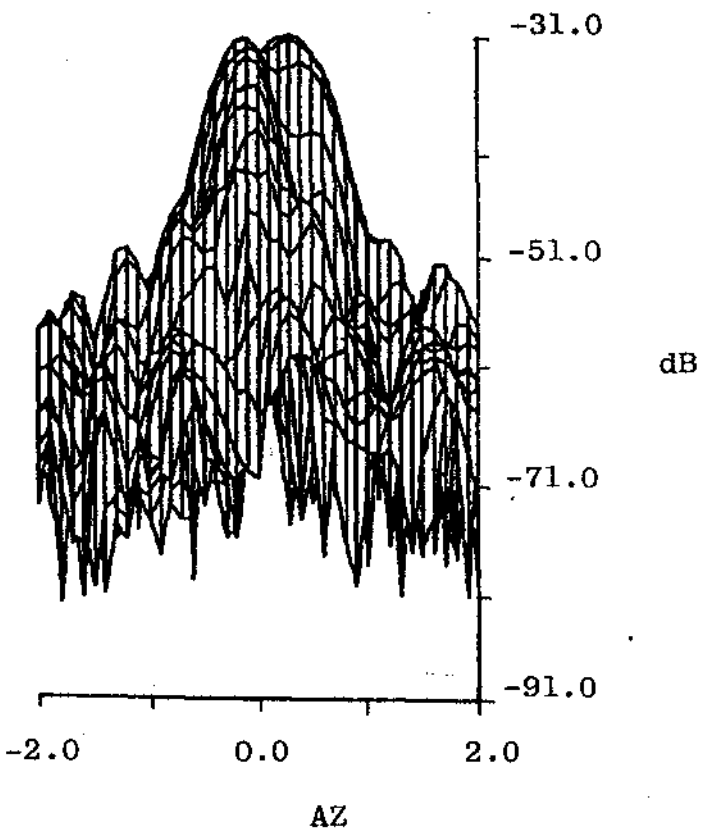


14 dB HORN
Scan: 0.0"
X-Pol RASTER 02

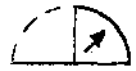


YHIGH=-33.2000
YLOW=-84.4000
CEILING=-20.0000
FLOOR=-90.0000

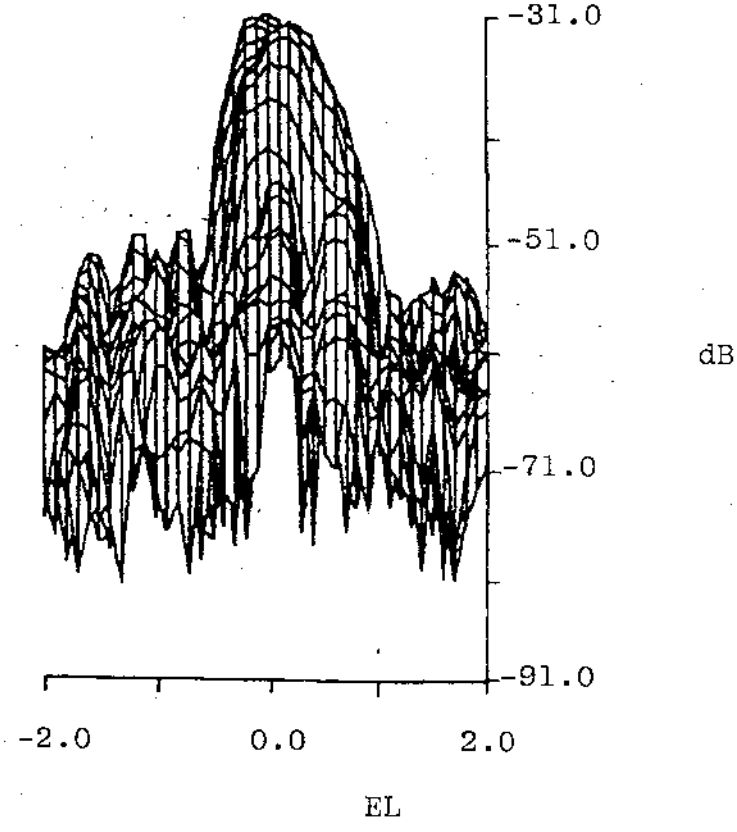
14 dB HORN
Scan: 0.0"
X-Pol RASTER 02



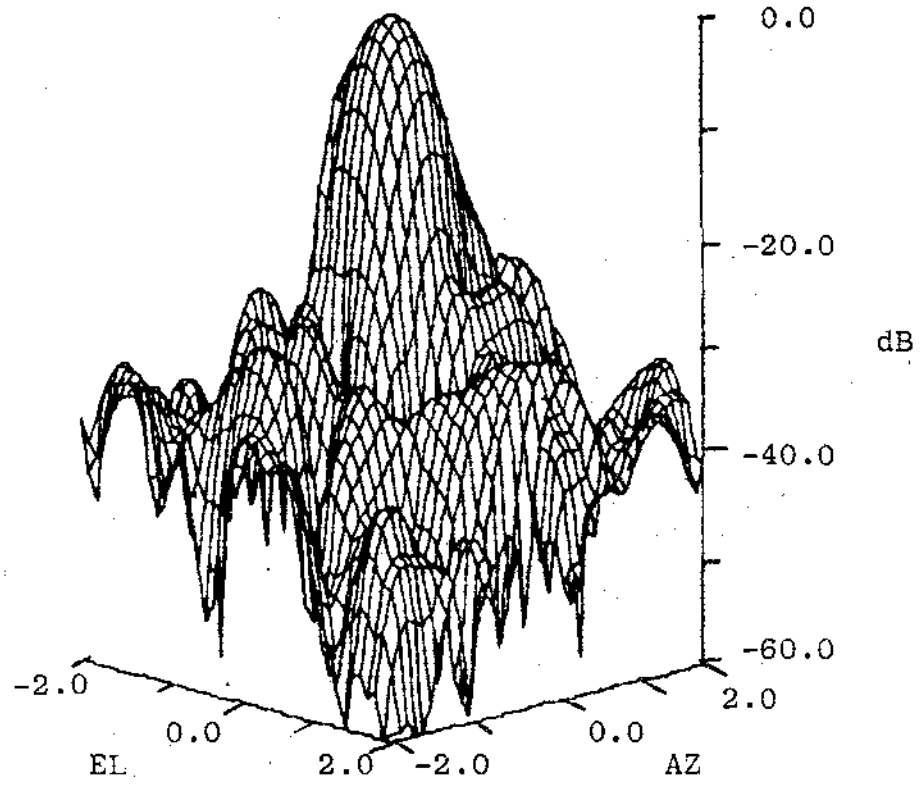
YHIGH=-33.2000
YLOW=-84.4000
CEILING=-20.0000
FLOOR=-80.0000



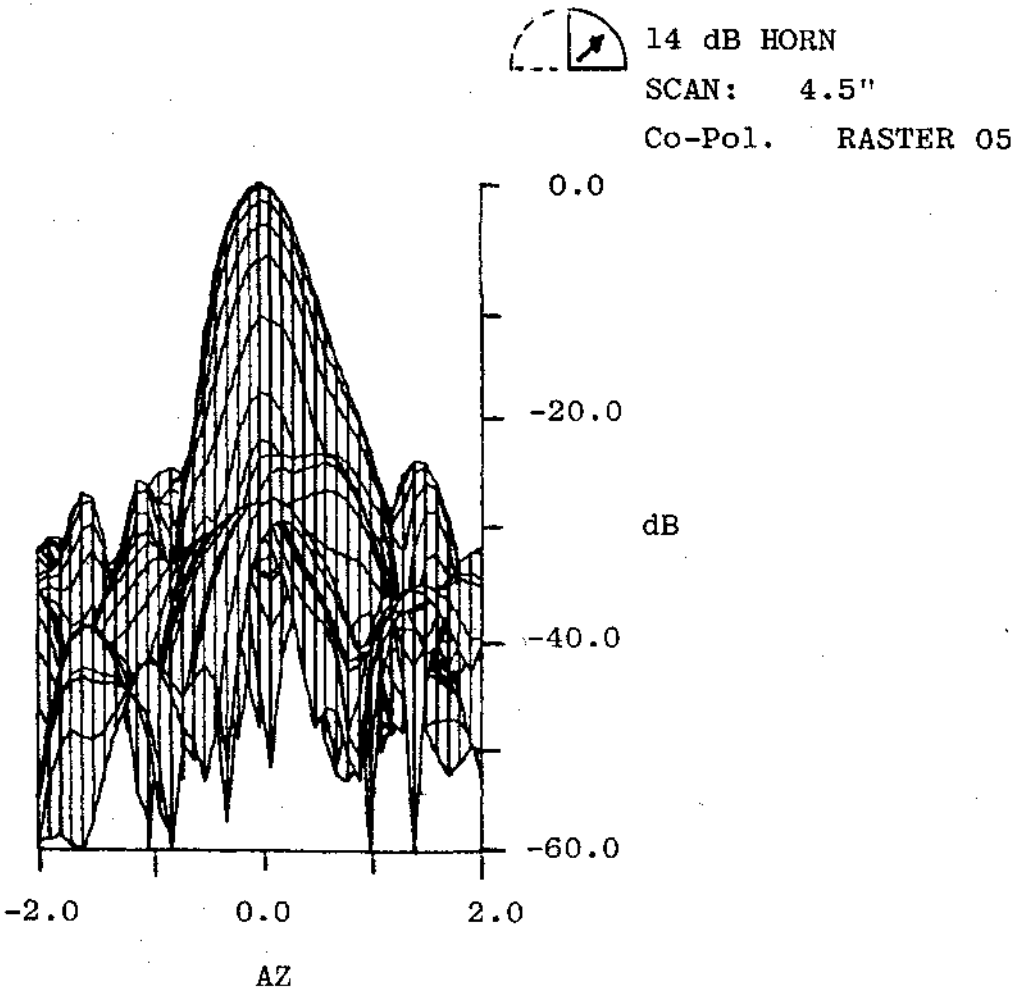
14 dB HORN
Scan: 0.0"
X-Pol RASTER 02



YHIGH= -2.5000
YLOW=-69.5000
CEILING= 0.0000
FLOOR=-60.0000



YHIGH= -2.5000
YLOW=-69.5000
CEILING= 0.0000
FLOOR=-80.0000

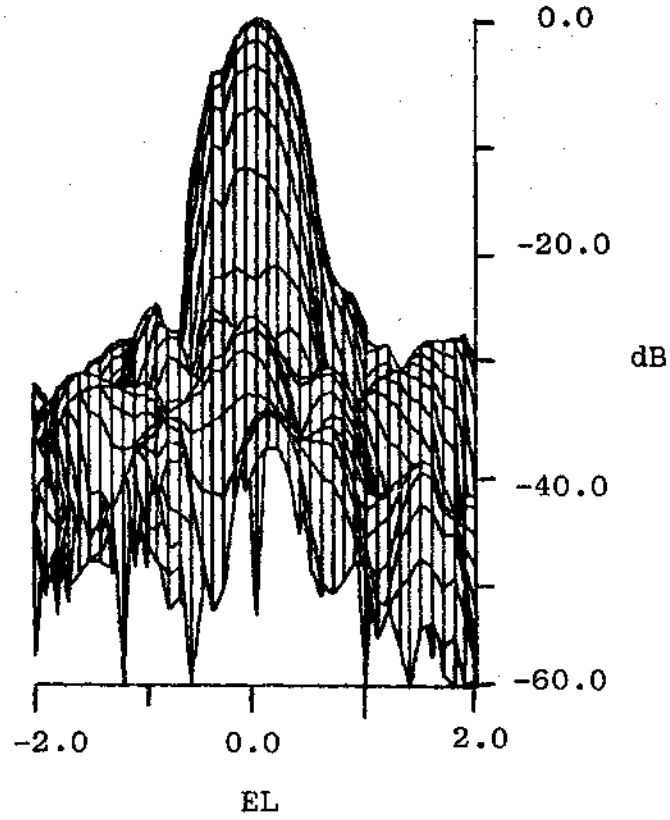


YHIGH= -2.5000
YLOW=-69.5000
CEILING= 0.0000
FLOOR=-60.0000

14 dB HORN

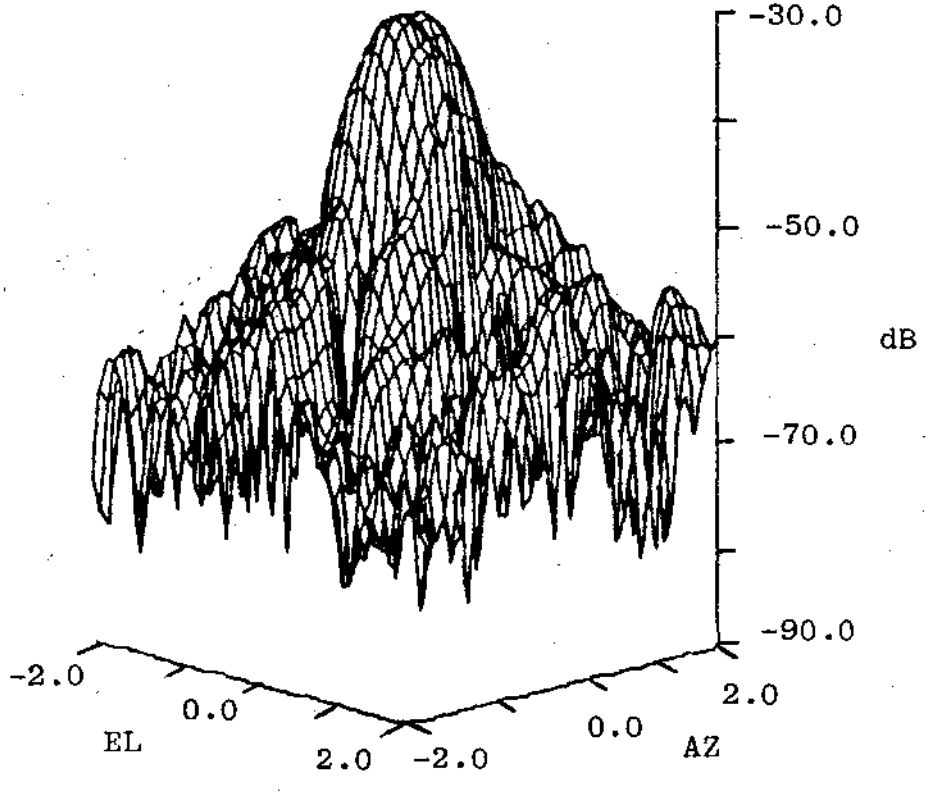
SCAN: 4.5"

Co-Pol. RASTER 05



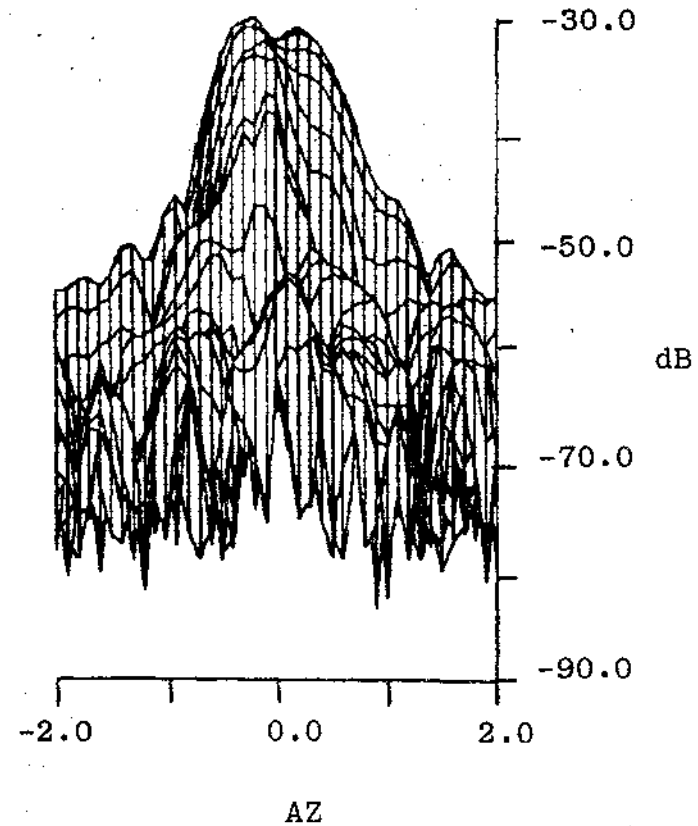
YHIGH=-32.5000
YLOW=-85.9000
CEILING=-20.0000
FLOOR=-80.0000

14 dB HORN
SCAN: 4.5"
X-Pol. RASTER 06



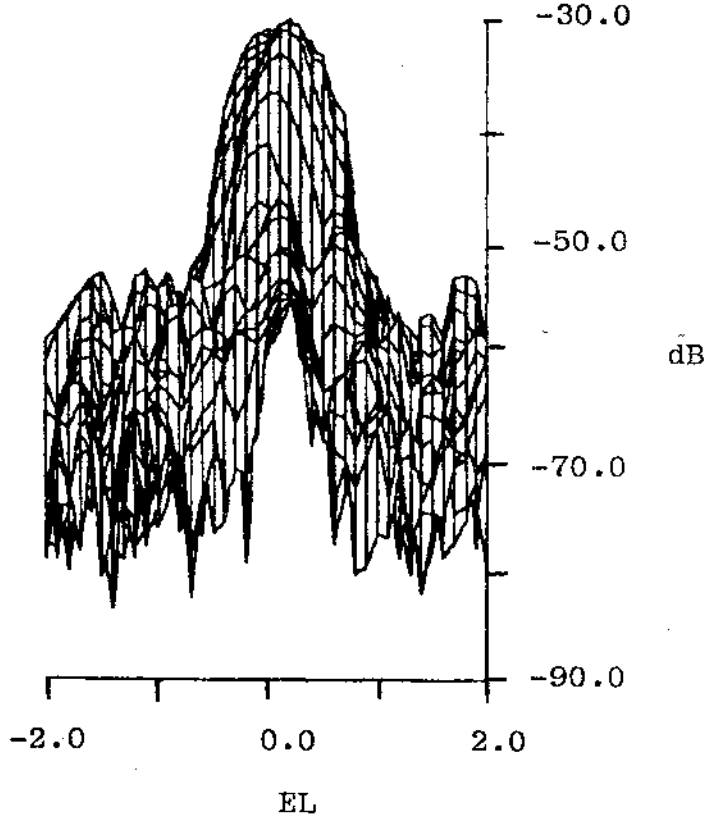
YHIGH=-32.5000
YLOW=-95.9000
CEILING=-20.0000
FLOOR=-90.0000

14 dB HORN
SCAN: 4.5"
X-Pol. RASTER 06



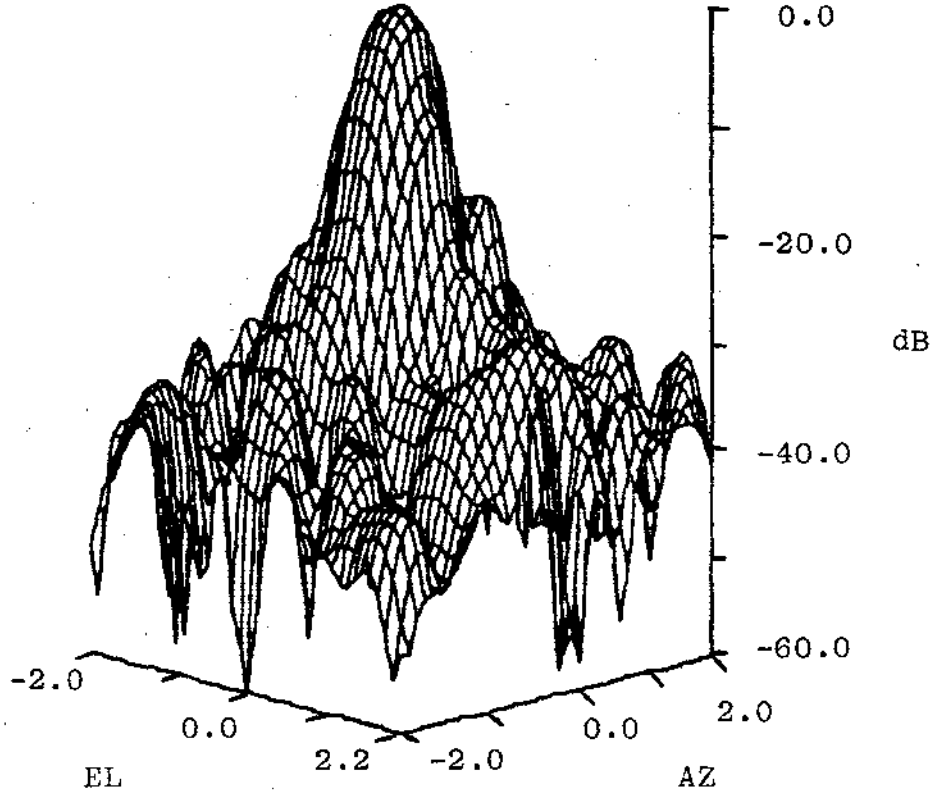
YHIGH=-32.5000
YLOW=-85.9000
CEILING=-20.0000
FLOOR=-90.0000

14 dB HORN
SCAN: 4.5"
X-Pol. RASTER 06

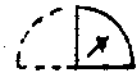


YHIGH= -2.4000
YLOW=-76.9000
CEILING= 0.0000
FLOOR=-60.0000

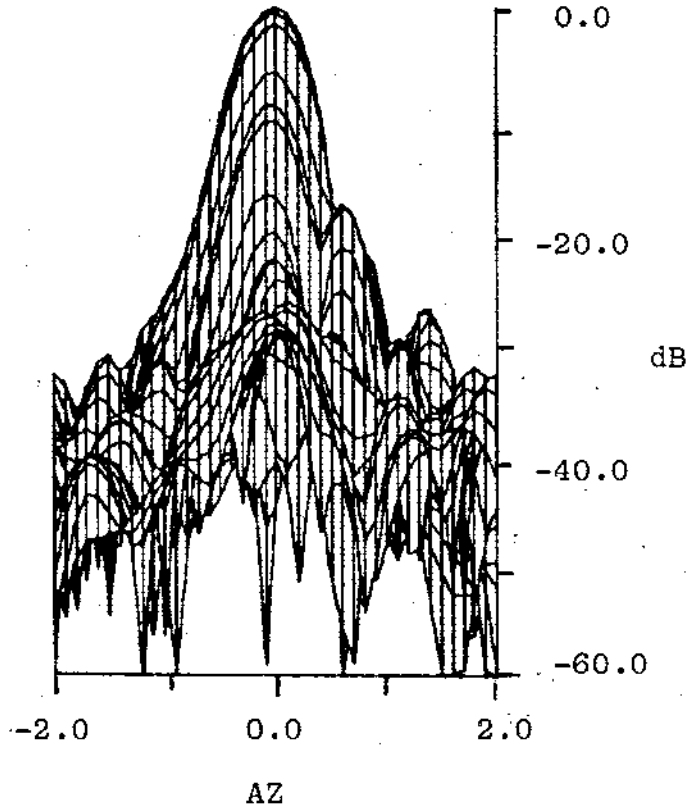
14 dB HORN
SCAN: 6.5"
Co-Pol. RASTER 03



YHIGH= -2.4000
YLOW=-76.9000
CEILING= 0.0000
FLOOR=-60.0000

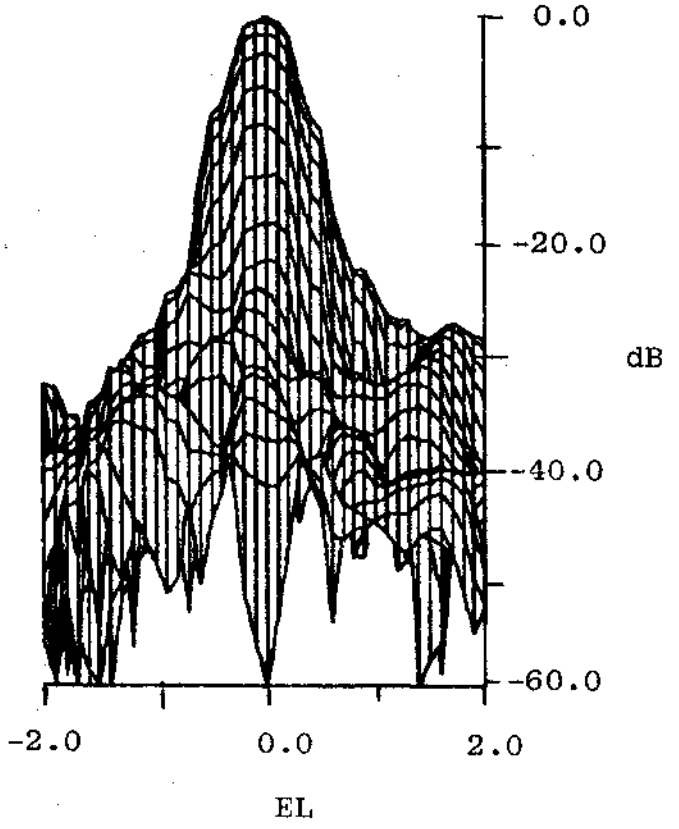


14 dB HORN
SCAN: 6.5"
Co-Pol. RASTER 03



VHIGH= -2.4000
YLOW=-76.9000
CEILING= 0.0000
FLOOR=-60.0000

14 dB HORN
SCAN: 6.5"
Co-Pol. RASTER 03

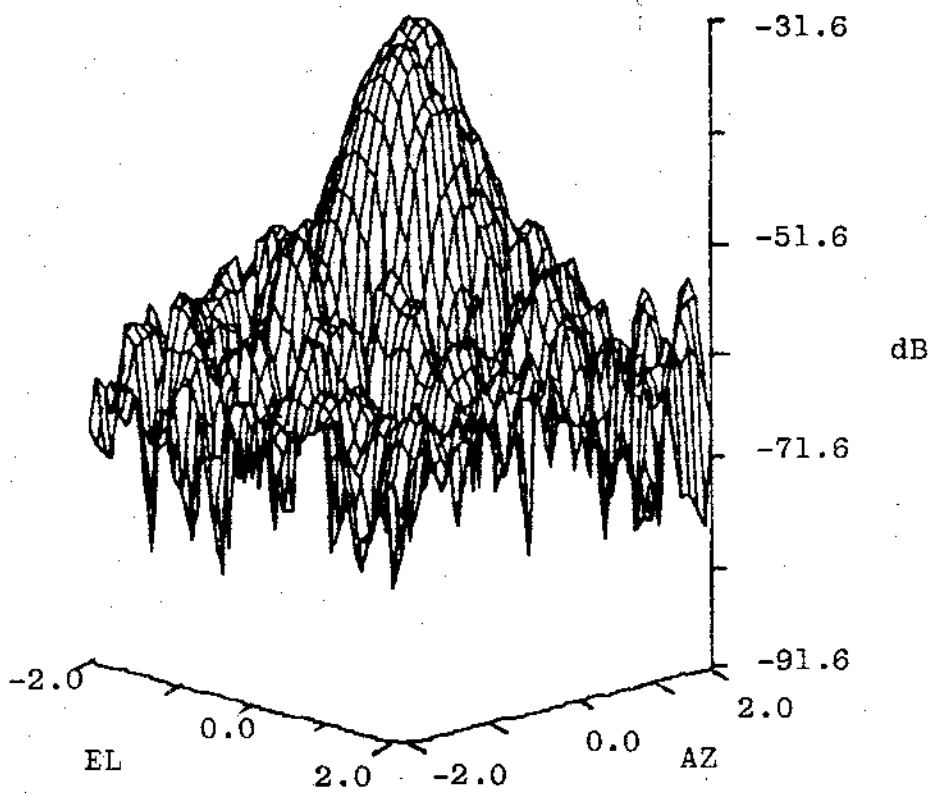


VHIGH=-34.0000
VLOW=-85.5000
CEILING=-20.0000
FLOOR=-90.0000

14 dB HORN

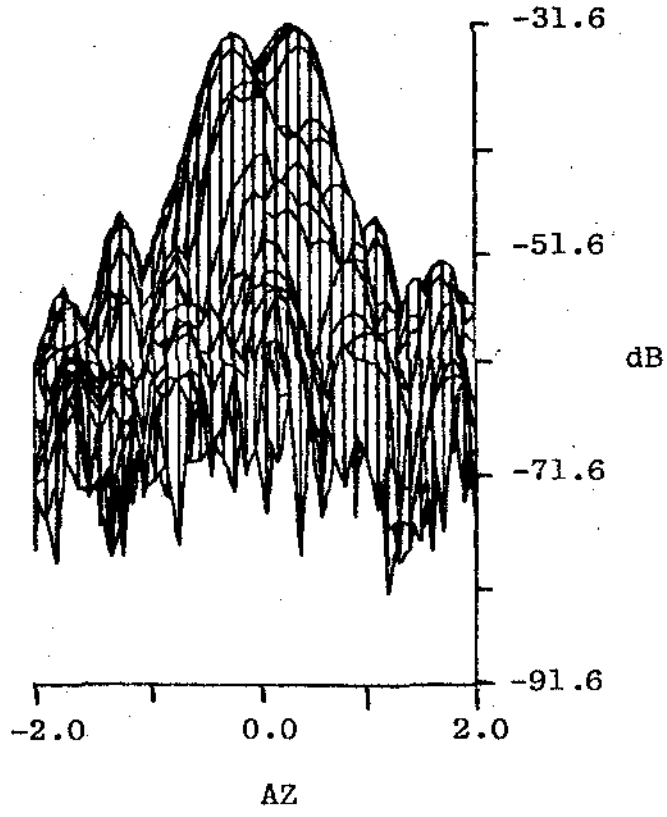
SCAN: 6.5"

X Pol. RASTER 04



YHIGH=-34.0000
YLOW=-55.5000
CEILING=-20.0000
FLOOR=-90.0000

14 dB HORN
SCAN: 6.5"
X-Pol. RASTER 04

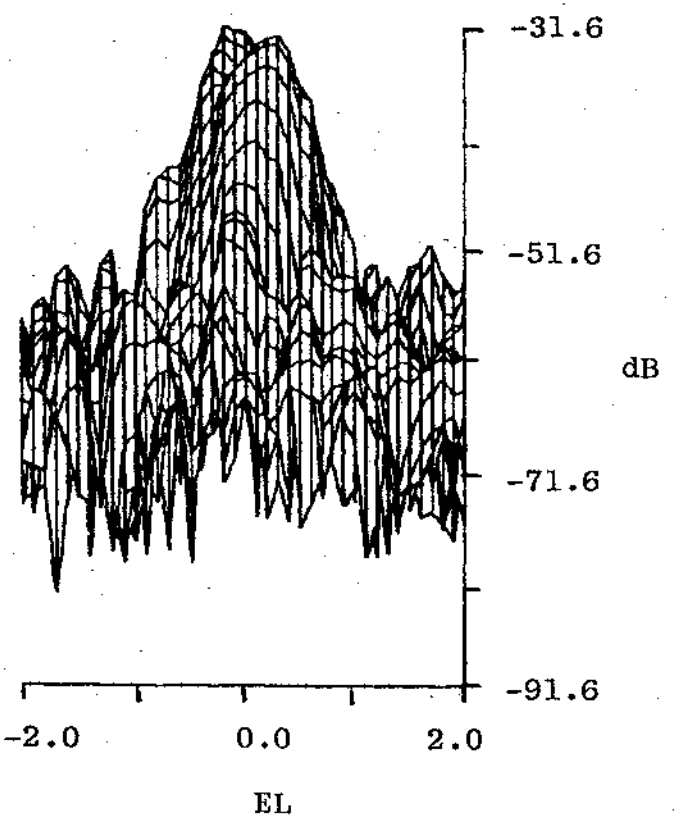


VHIGH=-34.0000
VLOW=-95.5000
CEILING=-20.0000
FLOOR=-80.0000

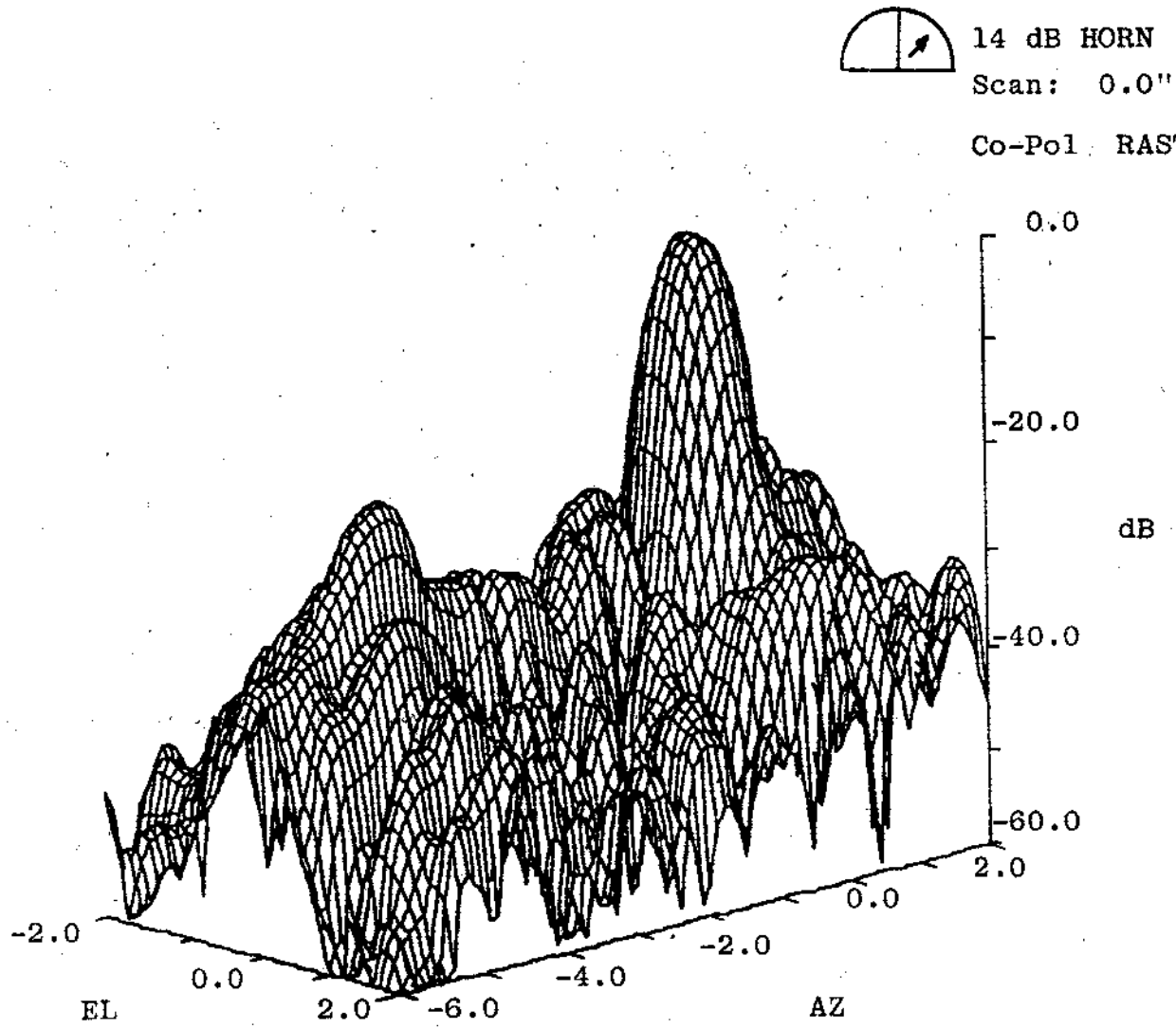
14 dB HORN

SCAN: 6.5"

X Pol. RASTER 04

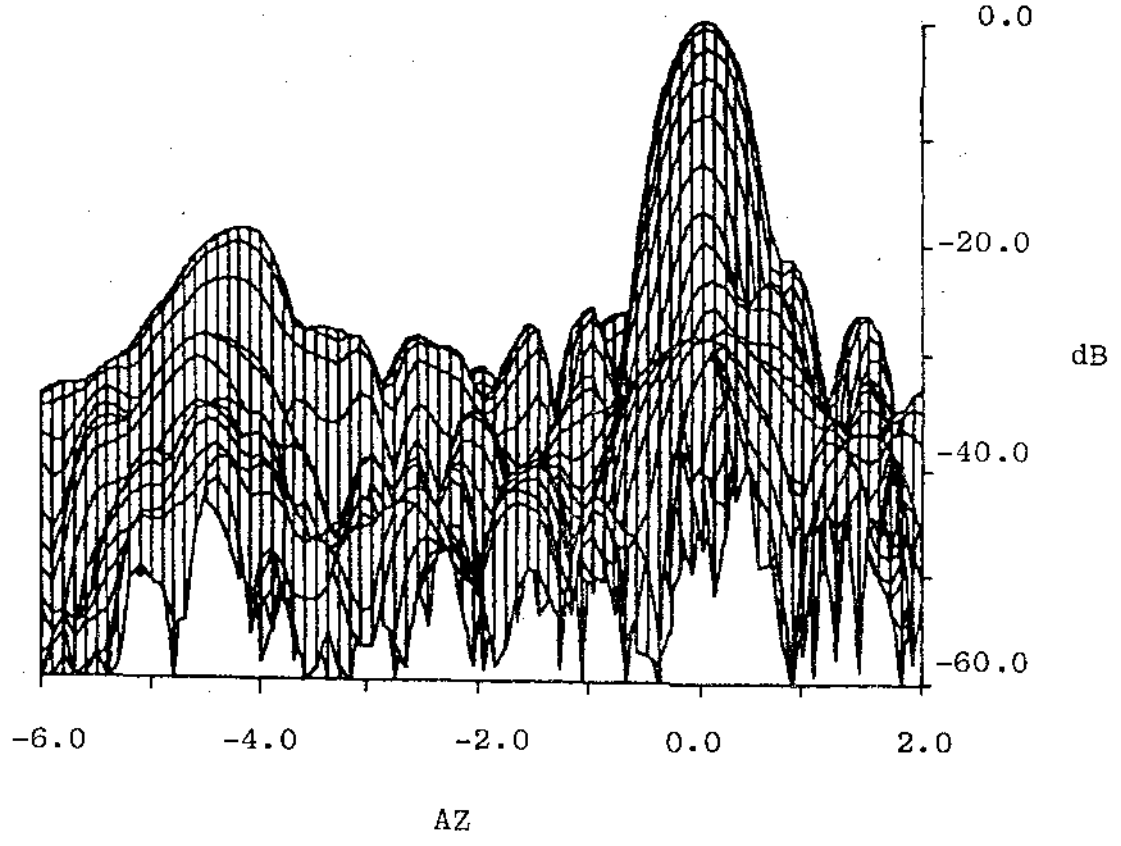


YHIGH= -3.4000
YLOW=-82.6000
CEILING= 0.0000
FLOOR=-60.0000



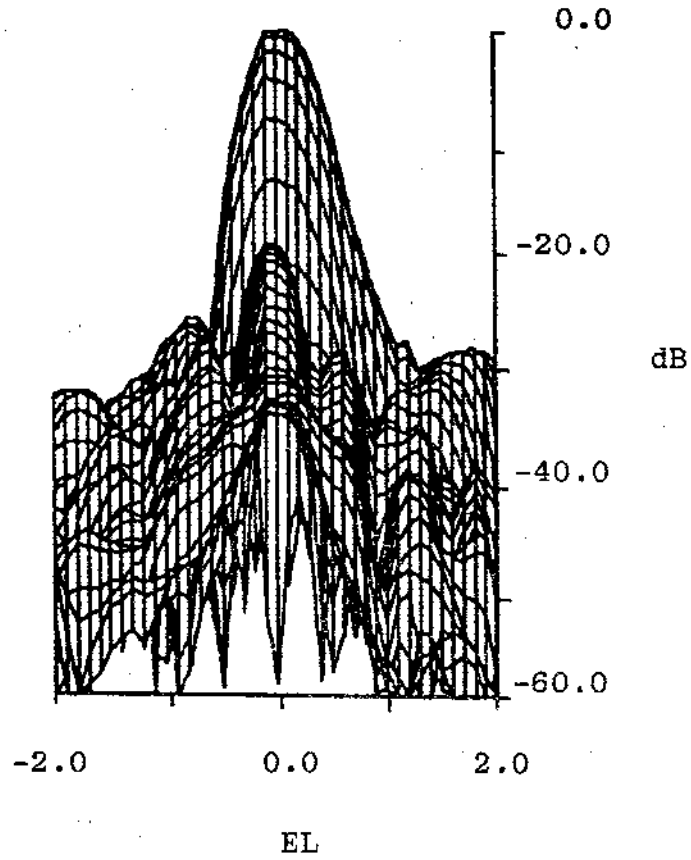
YHIGH= -3.4000
YLOW=-82.6000
CEILING= 0.0000
FLOOR=-80.0000

14 dB HORN
Scan: 0.0"
Co-Pol RASTER 11



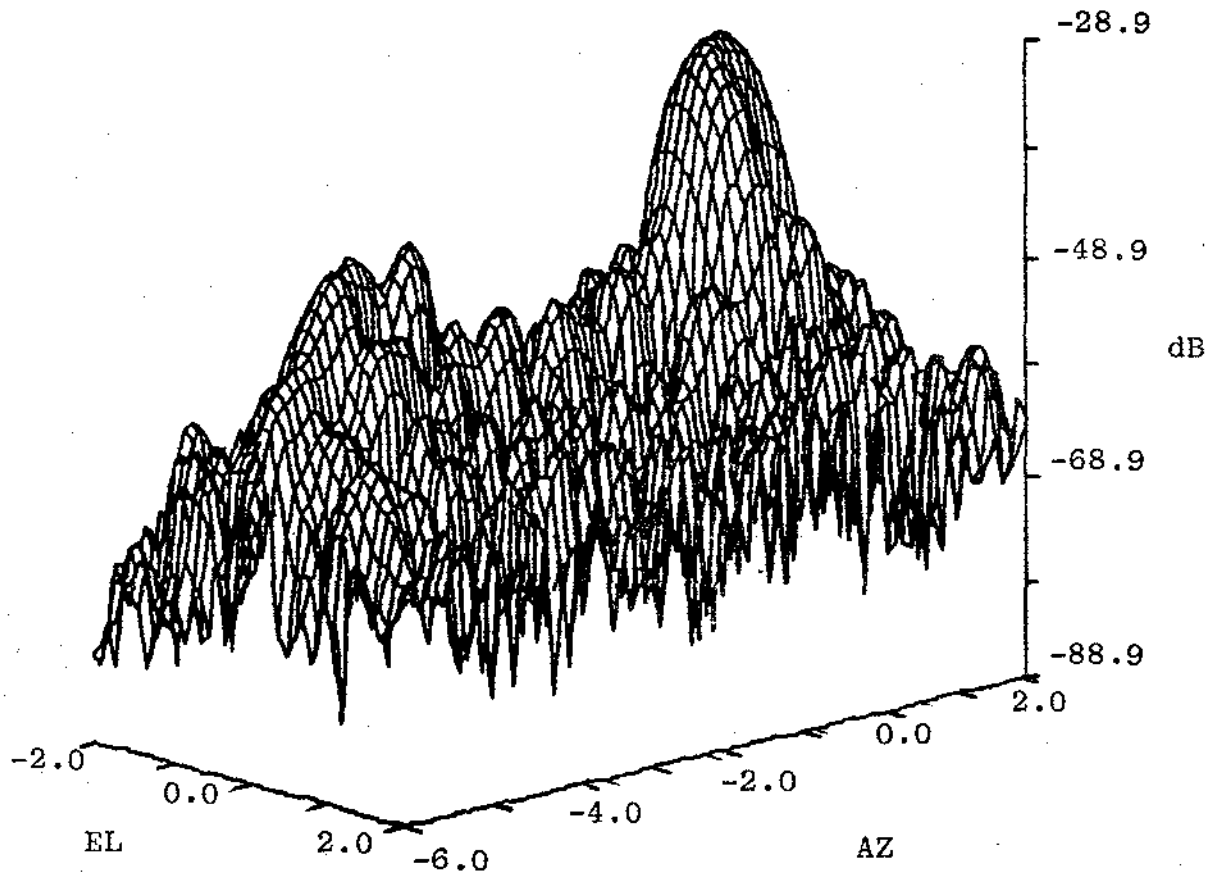
YHIGH= -3.4000
YLOW=-82.6000
CEILING= 0.0000
FLOOR=-60.0000

14 dB HORN
Scan: 0.0"
Co-Pol RASTER 11



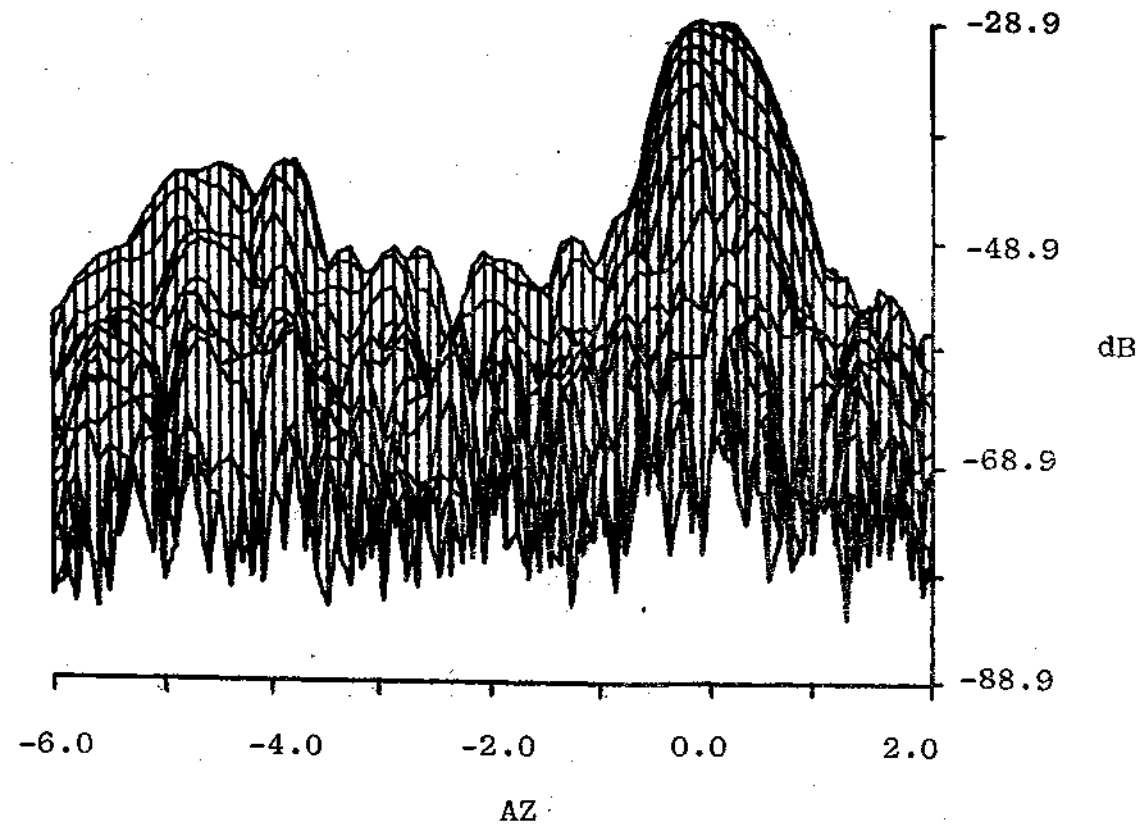
YHIGH=-32.3000
YLOW=-86.4000
CEILING=-20.0000
FLOOR=-80.0000

14 dB HORN
Scan: 0.0"
X-Pol RASTER 12



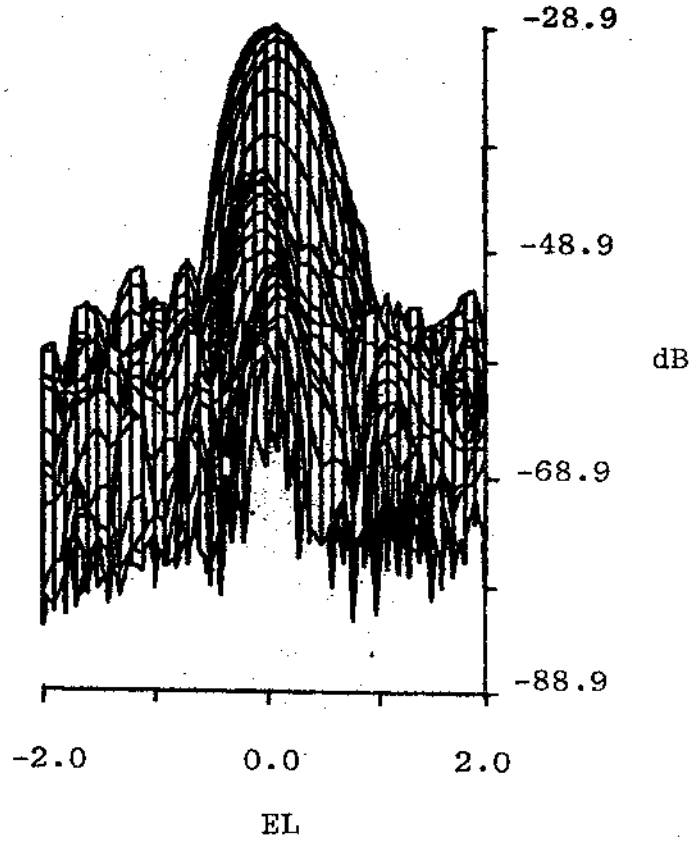
YHIGH=-32.3000
YLOW=-86.4000
CEILING=-20.0000
FLOOR=-90.0000

14 dB HORN
Scan: 0.0"
X-Pol RASTER 12



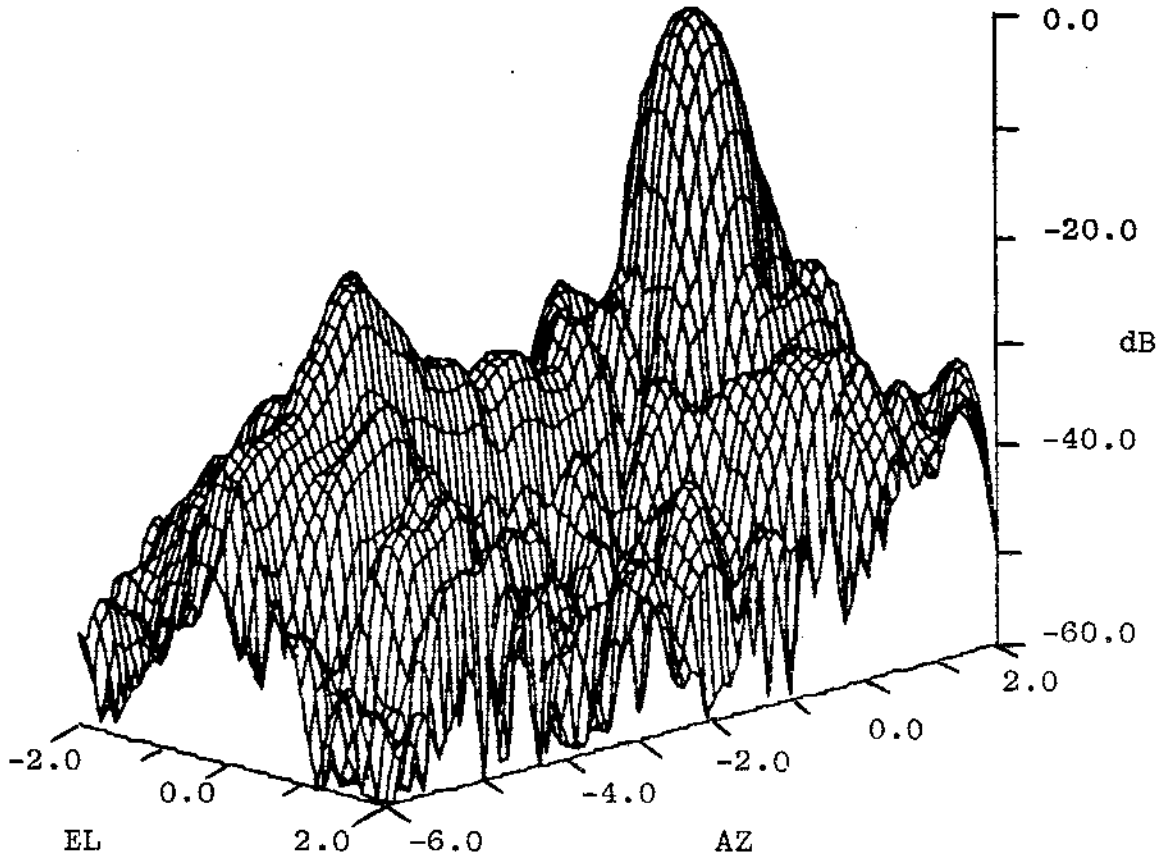
YHIGH=-32.3000
YLOW=-86.4000
CEILING=-20.0000
FLOOR=-89.0000

14 dB HORN
Scan: 0.0"
X-Pol RASTER 12



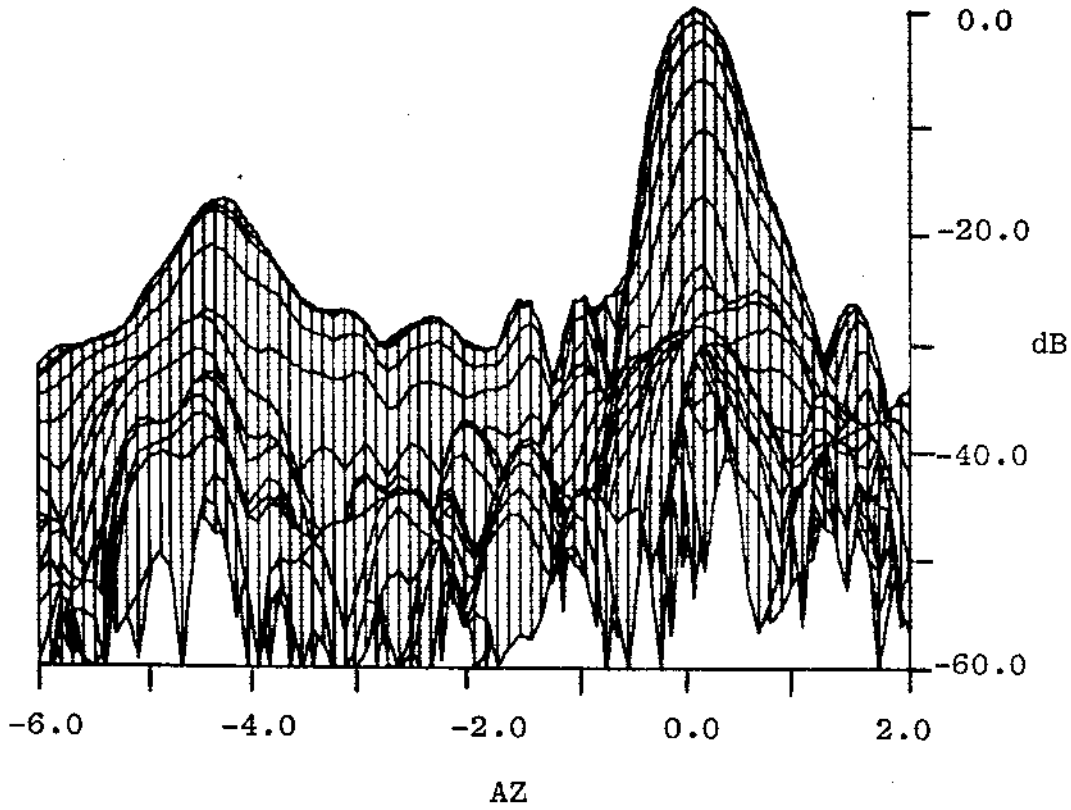
YHIGH= -3.5000
YLOW=-83.4000
CEILING= 0.0000
FLOOR=-60.0000

14 dB HORN
SCAN: 4.5"
Co-Pol. RASTER 13

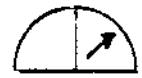


YHIGH= -3.5000
YLOW=-83.4000
CEILING= 0.0000
FLOOR=-60.0000

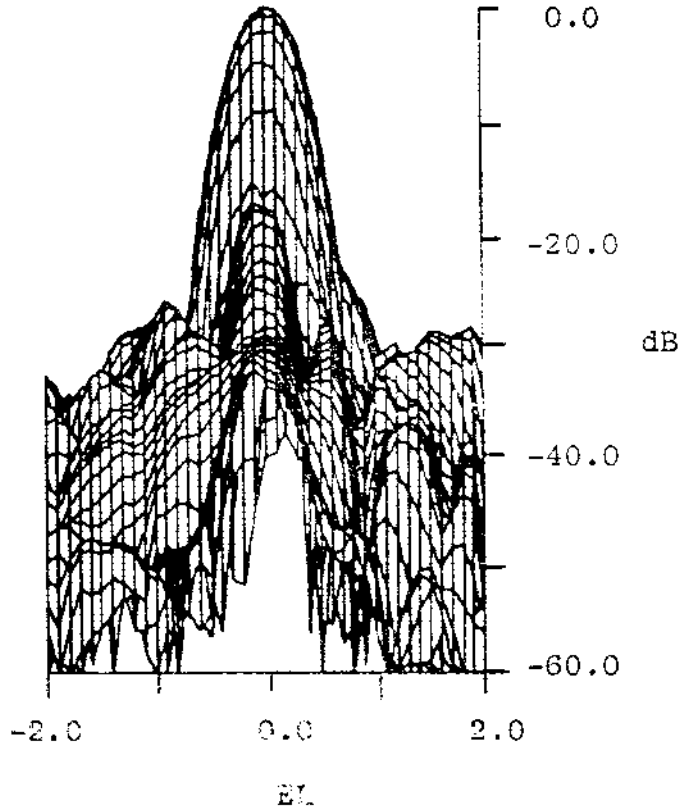
14 dB HORN
SCAN: 4.5"
Co-Pol. RASTER 13



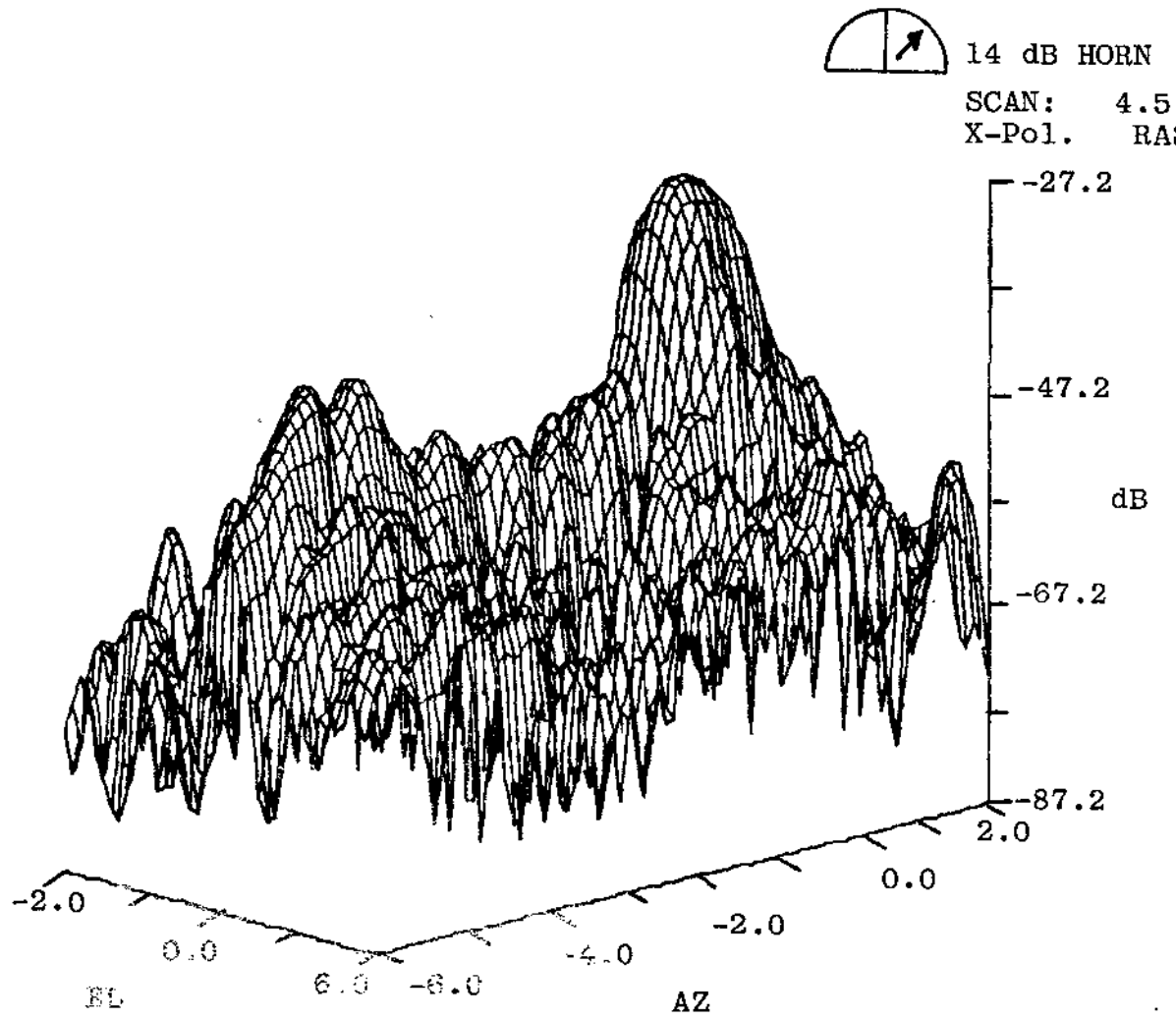
YHIGH= -3.5000
YLOW=-83.4000
CEILING= 0.0000
FLOOR=-60.0000



14 dB HORN
SCAN: 4.5"
Co-Pol. RASTER 13

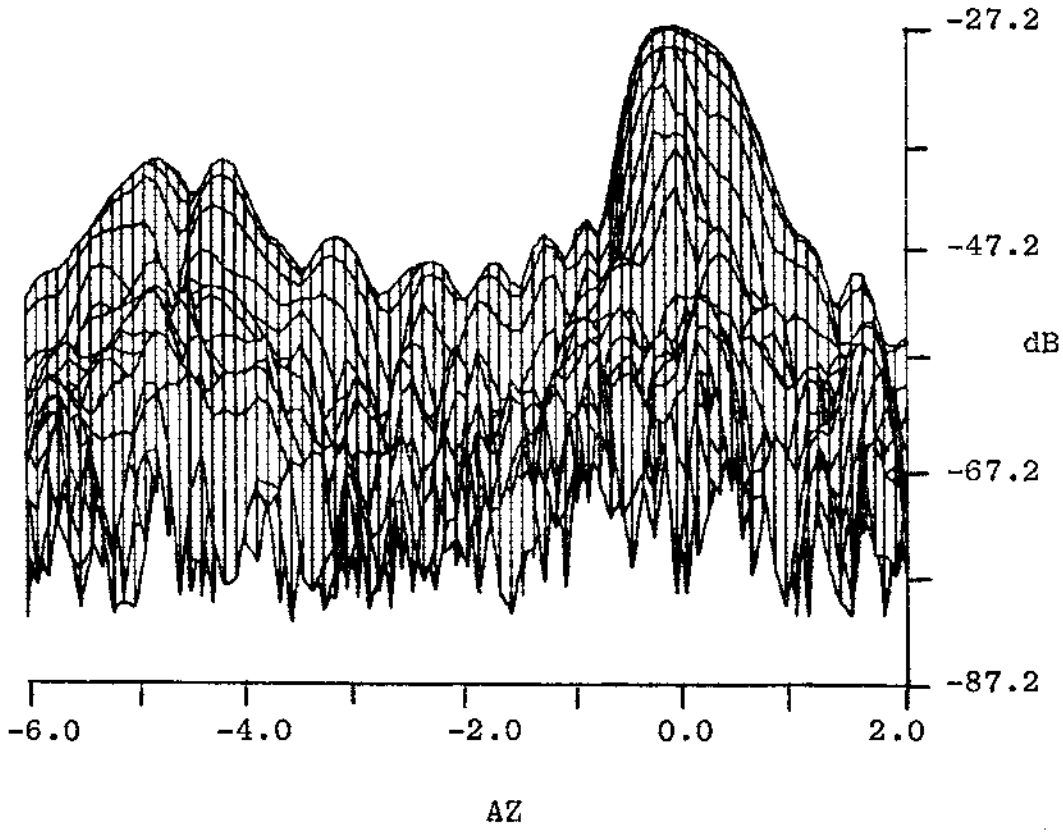


YHIGH=-30.7000
YLOW=-85.0000
CEILING=-20.0000
FLOOR=-80.0000



YHIGH=-30.7000
YLOW=-95.0000
CEILING=-20.0000
FLOOR=-80.0000

14 dB HORN
SCAN: 4.5"
X-Pol. RASTER 14

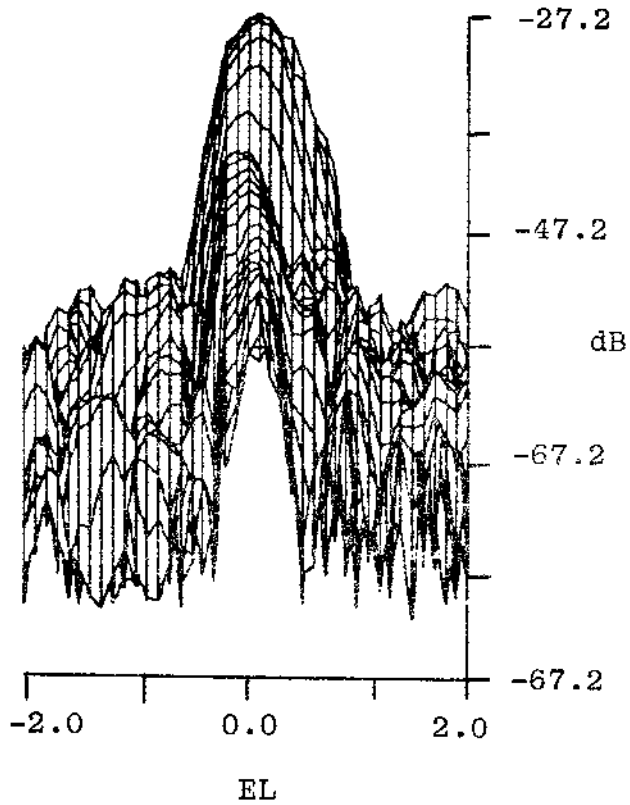


YHIGH=-30.7000
YLOW=-85.0000
CEILING=-20.0000
FLOOR=-90.0000

14 dB HORN

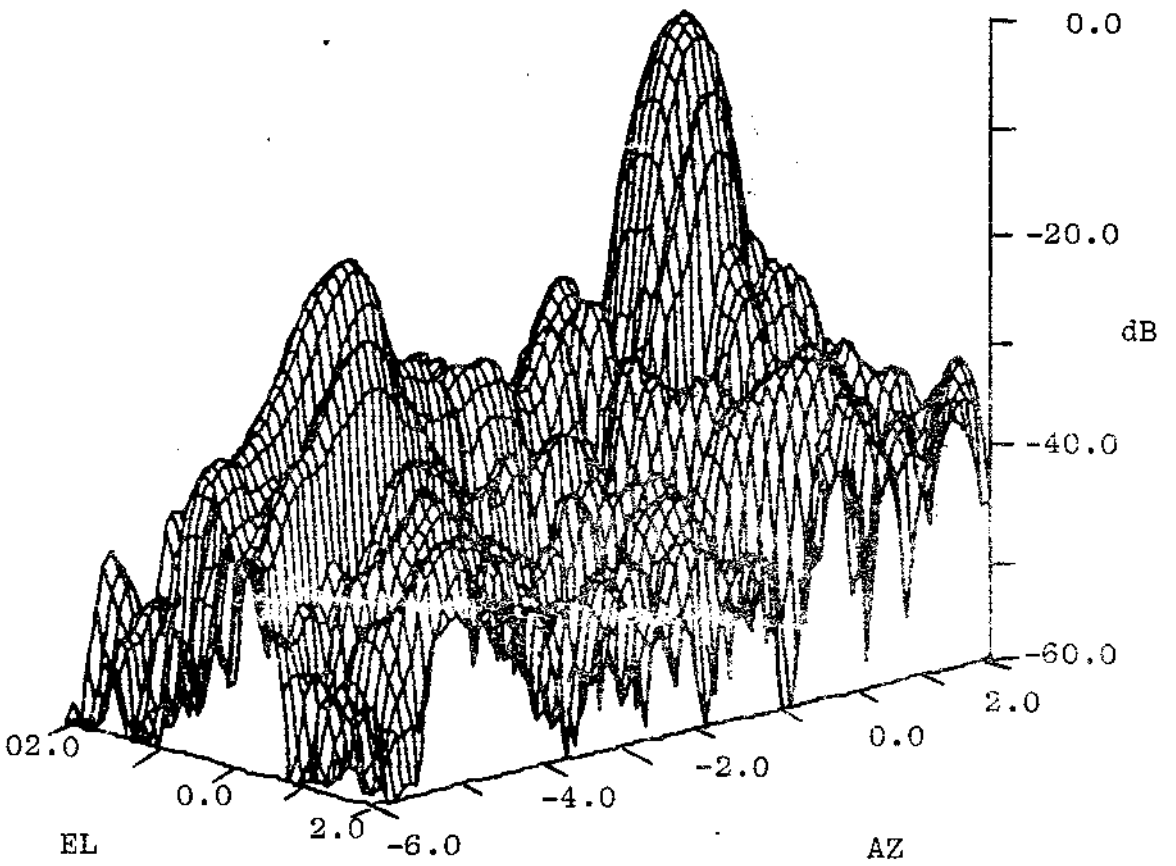
SCAN: 4.5"

X-Pol. RASTER 14



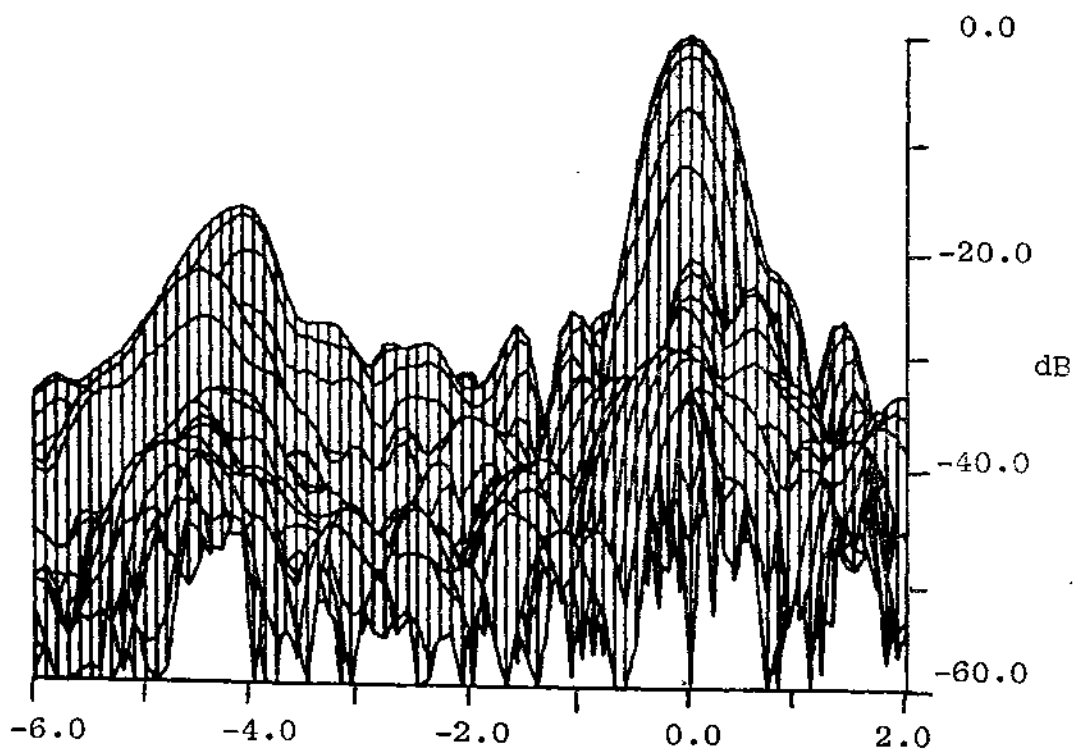
YHIGH= -3.0000
YLOW=-82.0000
CEILING=-20.0000
FLOOR=-80.0000

14 dB HORN
SCAN: 0.0"
Co-Pol. RASTER 36



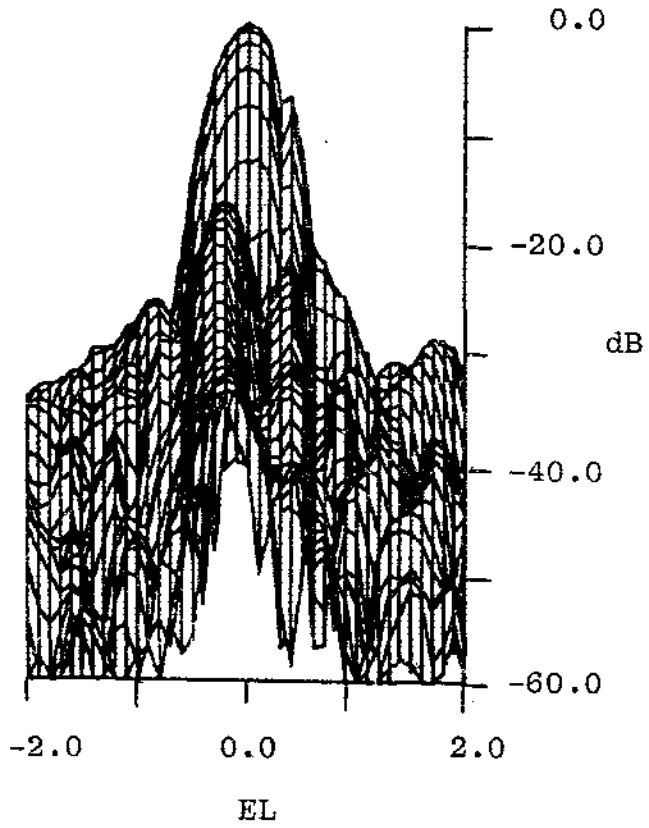
YHIGH= -3.0000
YLOW=-82.0000
CEILING=-20.0000
FLOOR=-80.0000

14 dB HORN
SCAN: 0.0"
Co-Pol. RASTER 36



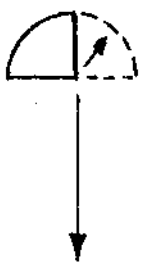
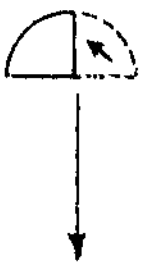
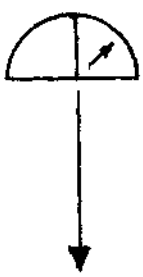
YHIGH= -3.0000
YLOW=-82.0000
CEILING=-20.0000
FLOOR=-80.0000

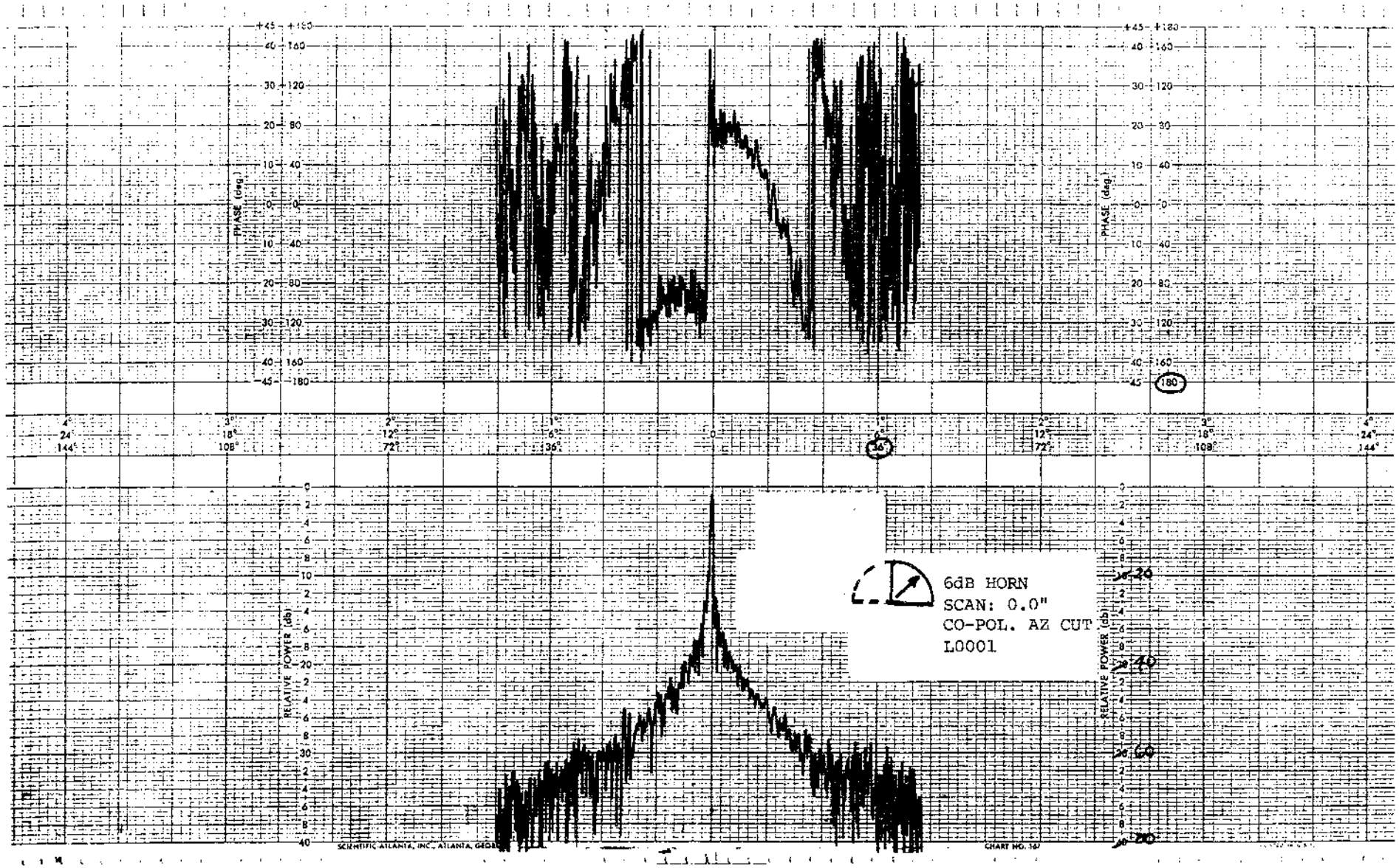
14 dB HORN
SCAN: 0.0"
Co-Pol. RASTER 36

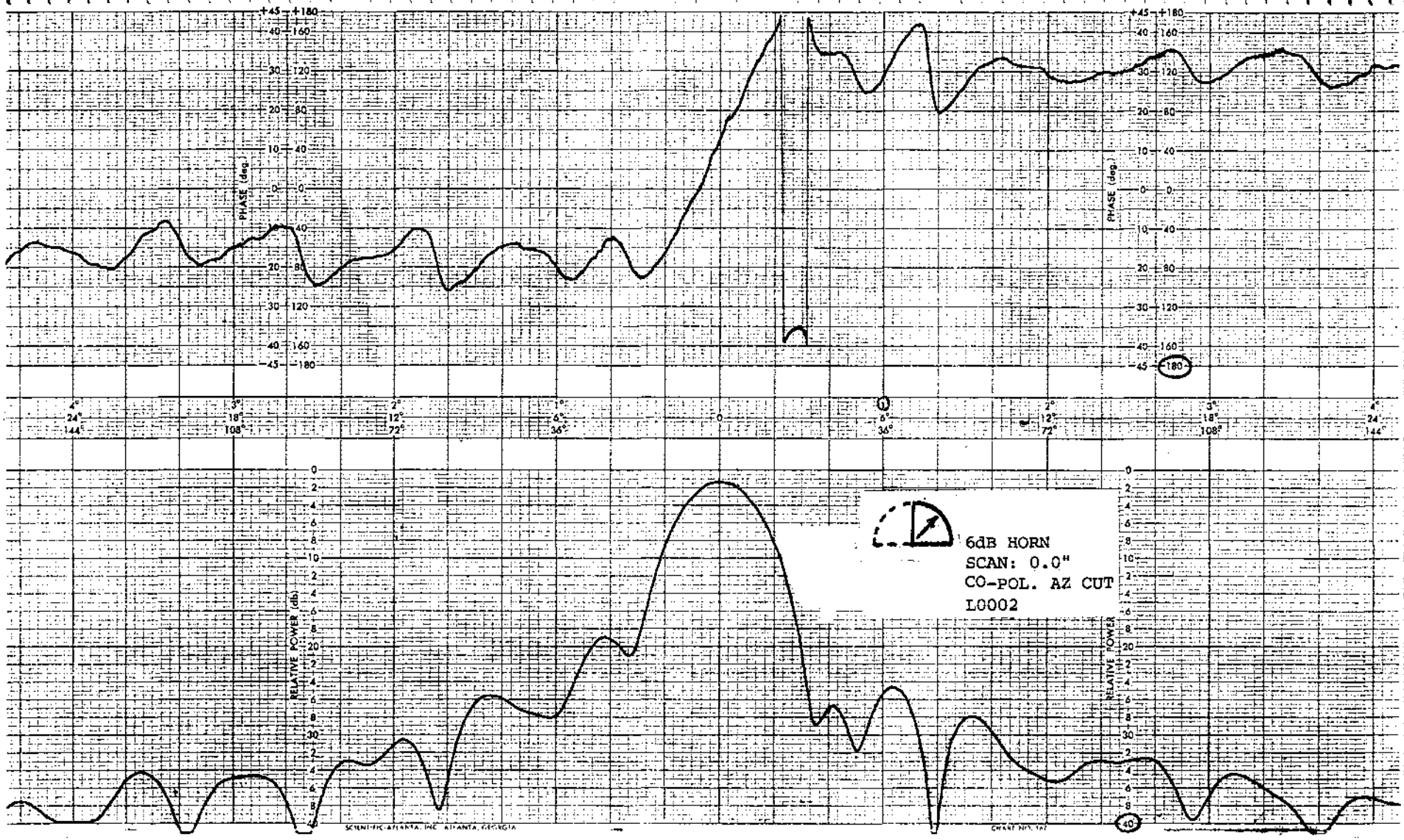


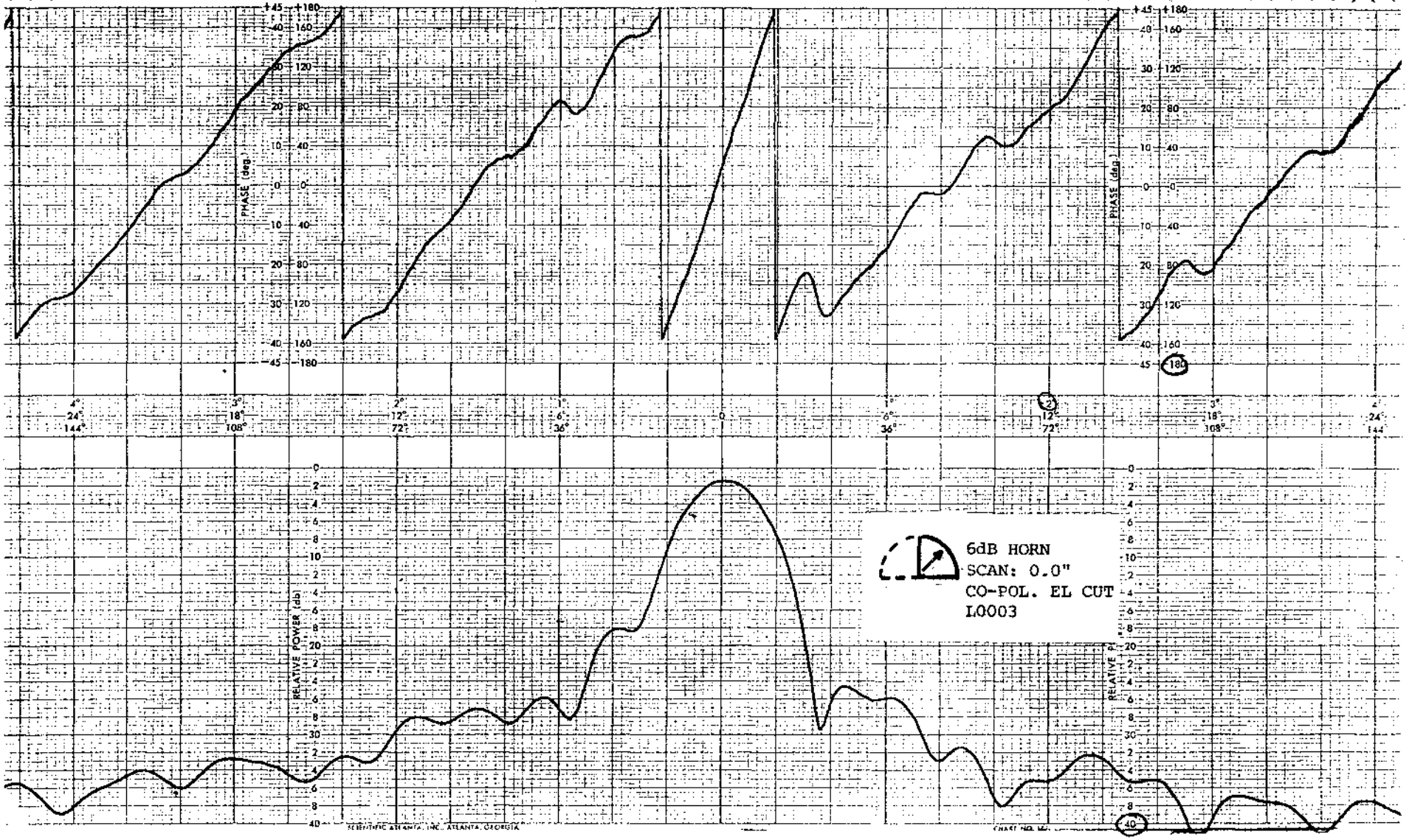
LSST - IV

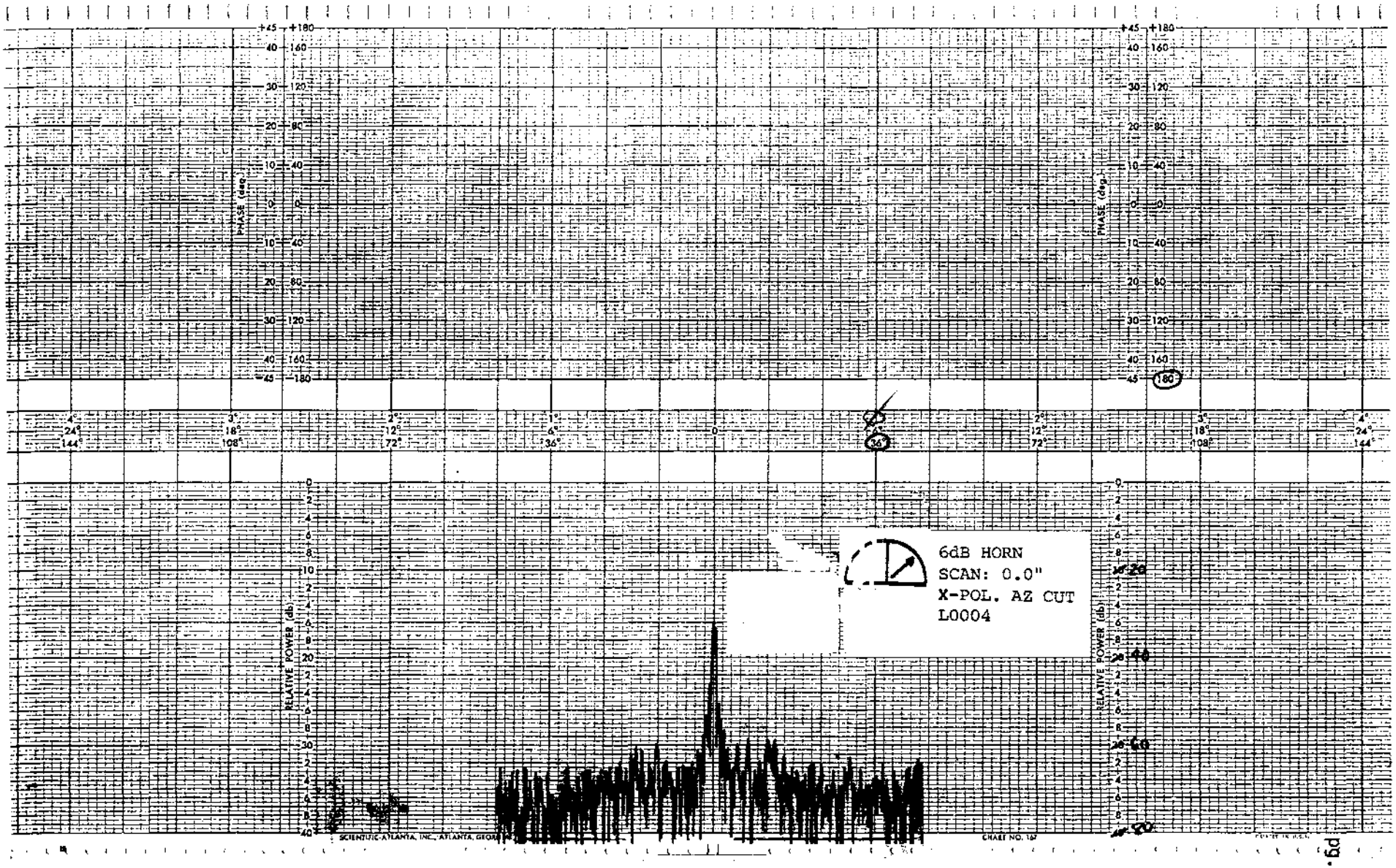
SECONDARY PATTERN LOG

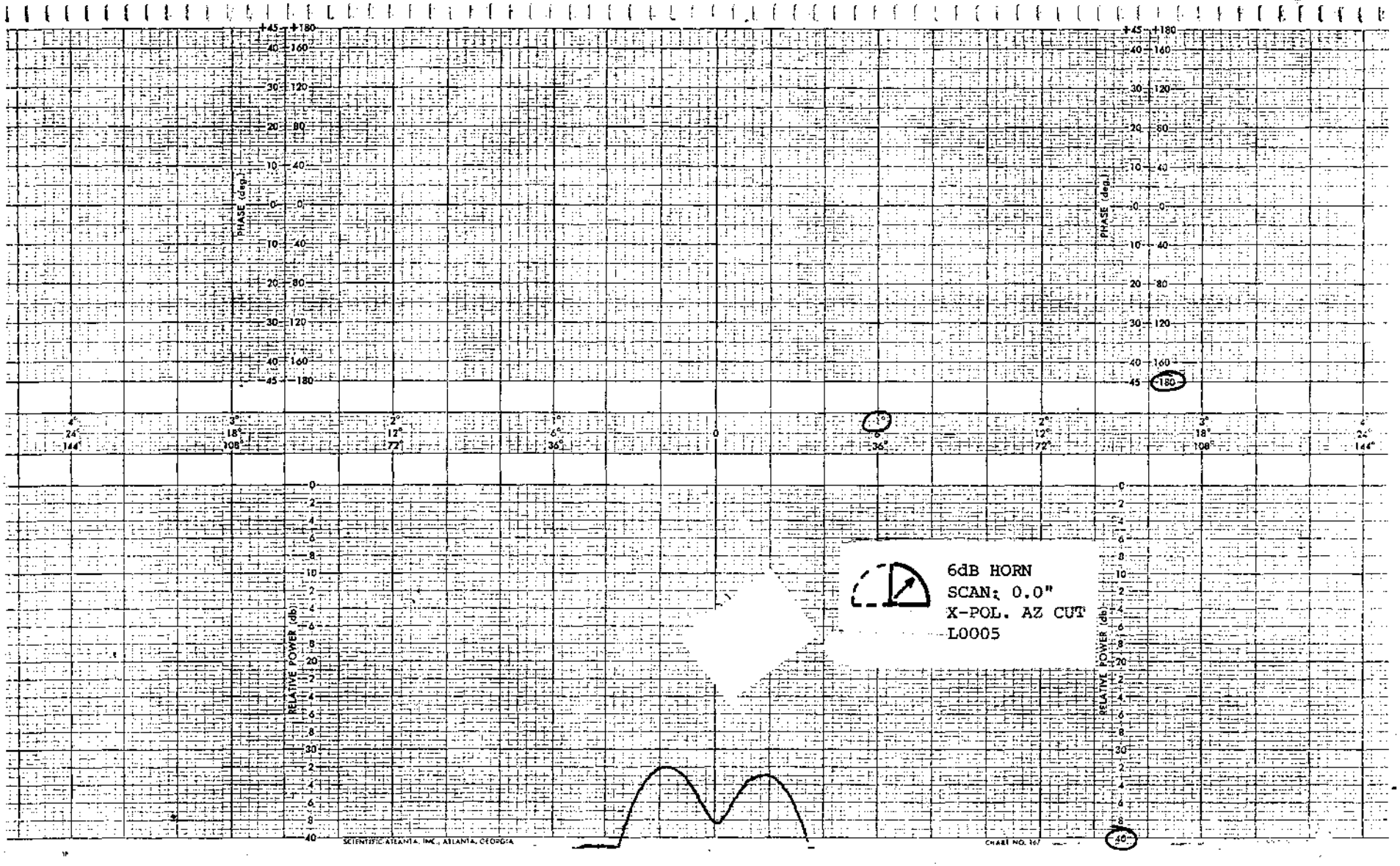
CONFIGURATION	HORN	SCAN	POL.	PK. GAIN	PATTERN	FILE NAME	PAGE NUMBER
	6 dB	0.0"	CO	50.85	± 45° AZ	L0001	120
	"	"	CO	"	± 5° AZ	L0002	121
	"	"	CO	"	± 5° EL	L0003	122
	"	"	X	-	± 45° AZ	L0004	123
	"	"	X	-	± 5° AZ	L0005	124
	"	"	X	-	± 5° EL	L0006	125
	6 dB	4.5"	CO	50.55	± 45° AZ	L0027	126
	"	"	CO	"	± 5° AZ	L0025	127
	"	"	CO	"	± 5° EL	L0026	128
	"	"	X	-	± 45° AZ	L0030	129
	"	"	X	-	± 5° AZ	L0028	130
	"	"	X	-	± 5° EL	L0029	131
	6 dB	0.0"	CO	35.25	± 45° AZ	L0074	132
	"	"	CO	"	± 5° AZ	L0073	133
	"	"	CO	"	± 5° EL	L0075	134
	"	"	X	-	± 45° AZ	L0078	135
	"	"	X	-	± 5° AZ	L0077	136
	"	"	X	-	± 5° EL	L0076	137
	6 dB	0.0"	CO	34.65	± 45° AZ	L0079	138
	"	"	CO	"	± 5° AZ	L0080	139
	"	"	CO	"	± 5° EL	L0081	140
	"	"	X	-	± 45° AZ	L0084	141
	"	"	X	-	± 5° AZ	L0083	142
	"	"	X	-	± 5° EL	L0082	143
	6 dB	0.0"	CO	50.75	± 45° AZ	L0051	144
	"	"	CO	"	± 5° AZ	L0049	145
	"	"	CO	"	± 5° EL	L0050	146
	"	"	X	-	± 45° AZ	L0054	147
	"	"	X	-	± 5° AZ	L0052	148
	"	"	X	-	± 5° EL	L0053	149

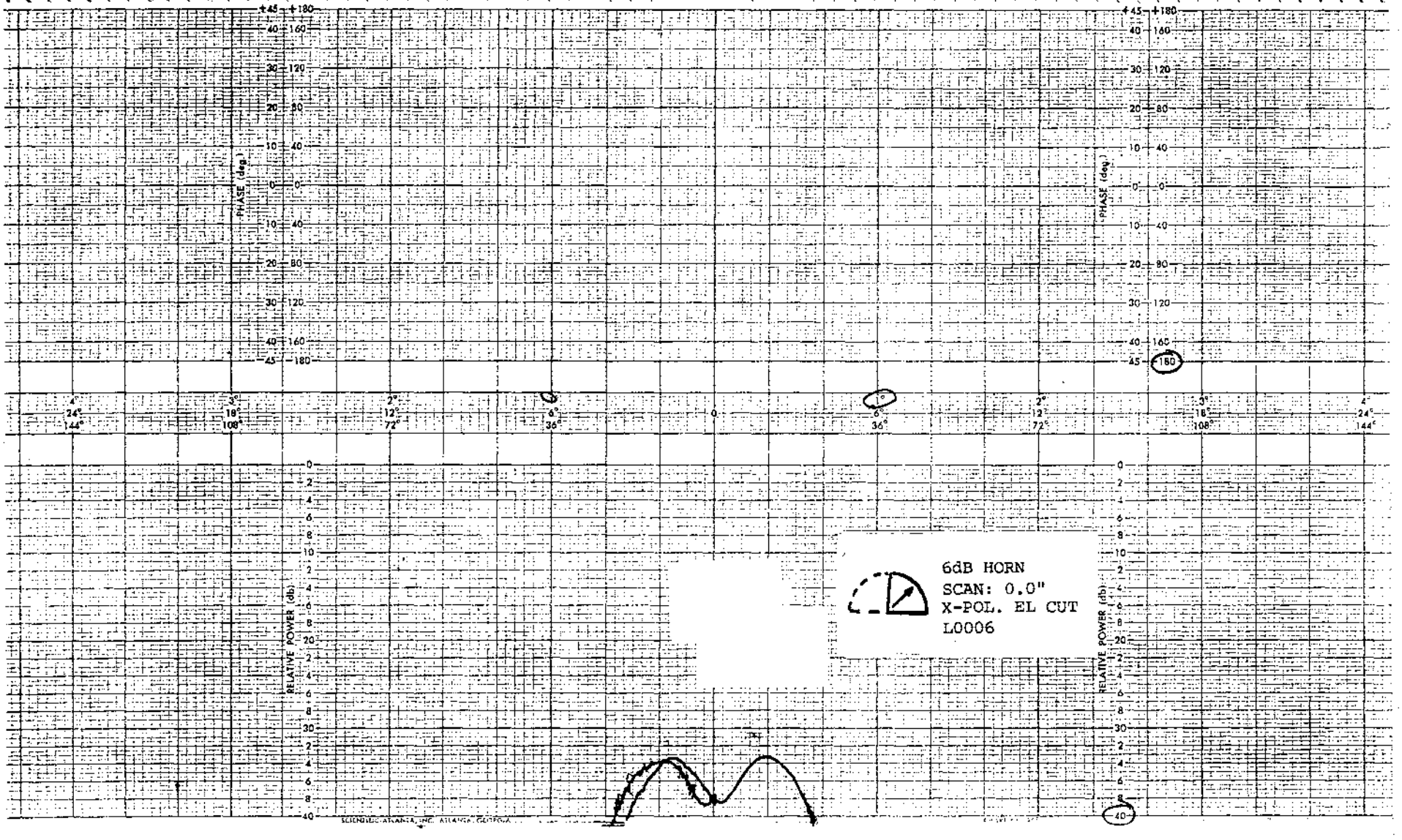

PHASE (deg)
RELATIVE POWER (db)
6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
L0001
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA
CHART NO. 167

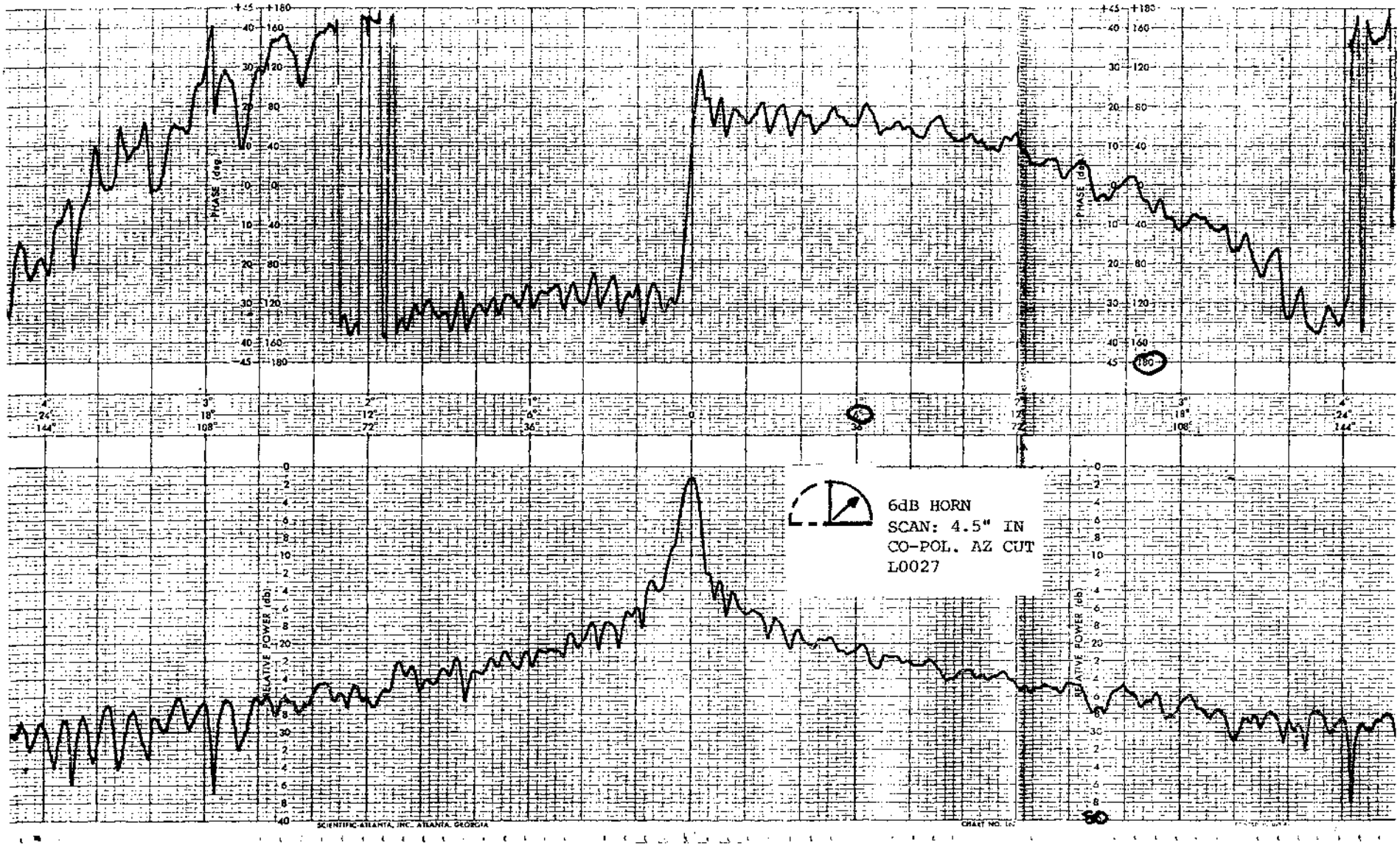

PHASE (deg.)
RELATIVE POWER (db)
6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
L0002

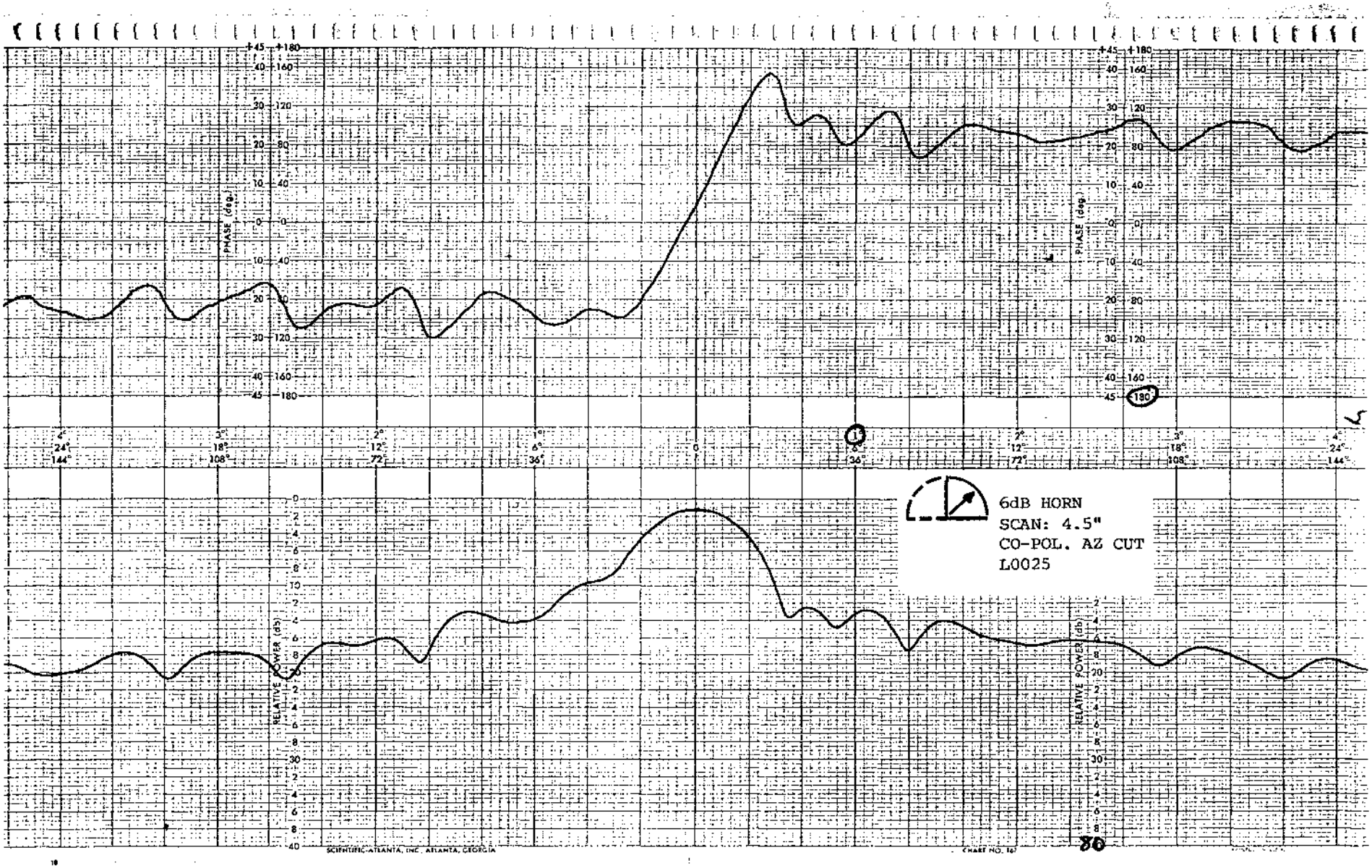

PHASE (deg)
RELATIVE POWER (db)
6dB HORN
SCAN: 0.0"
CO-POL. EL CUT
L0003

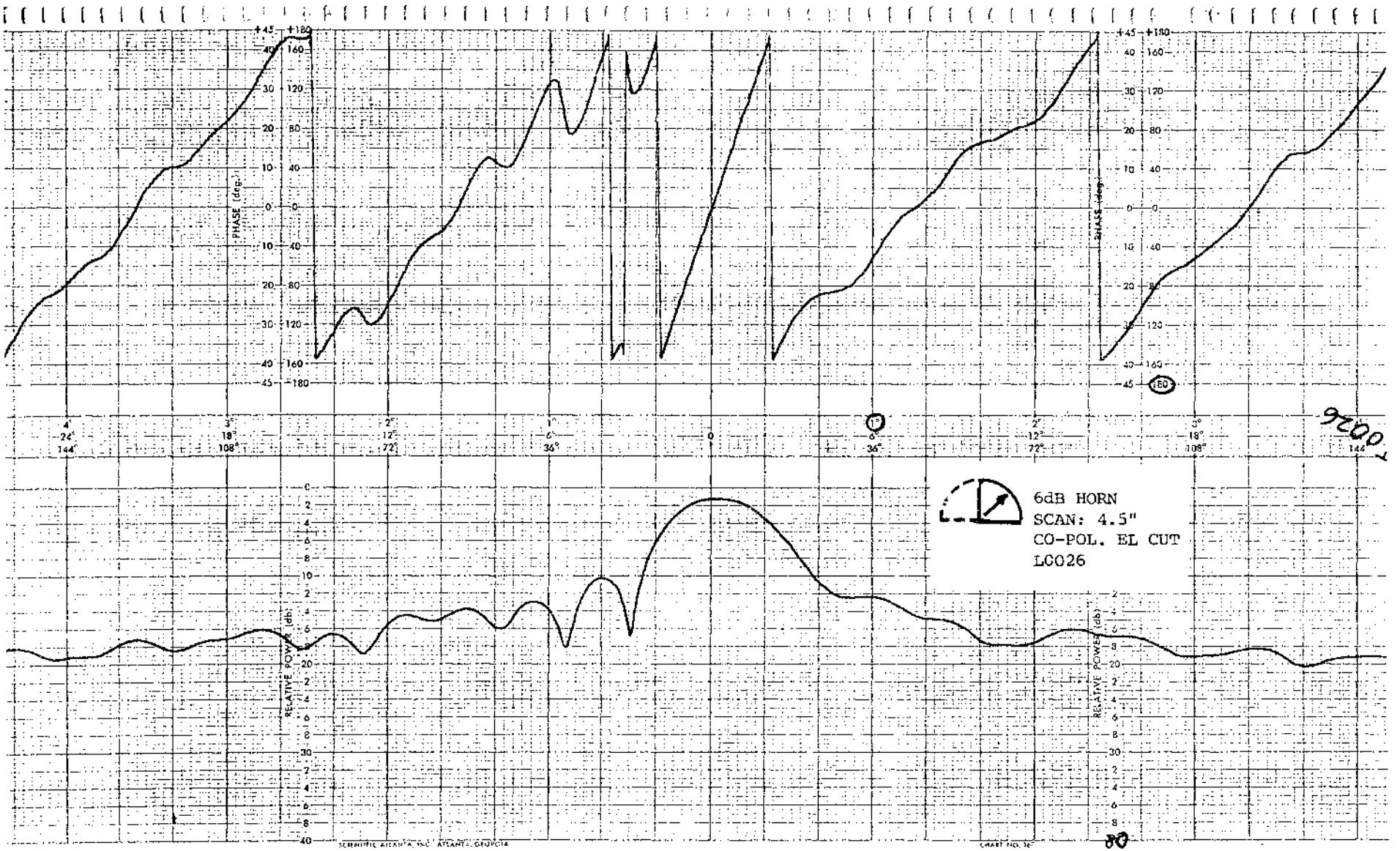

6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
L0004
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA
CHART NO. 167

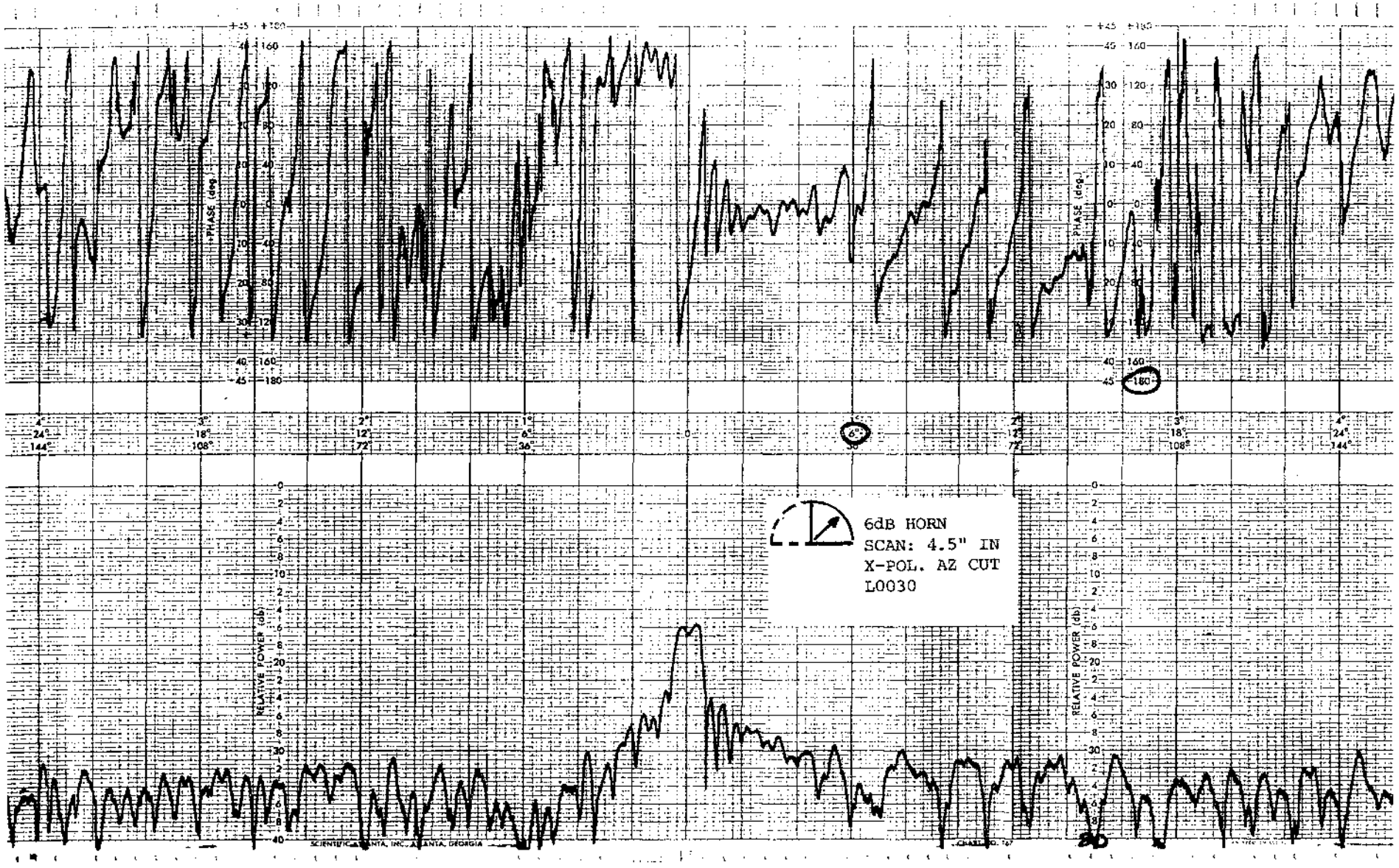

6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
L0005
PHASE (deg.)
RELATIVE POWER (dB)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA
CHART NO. 367

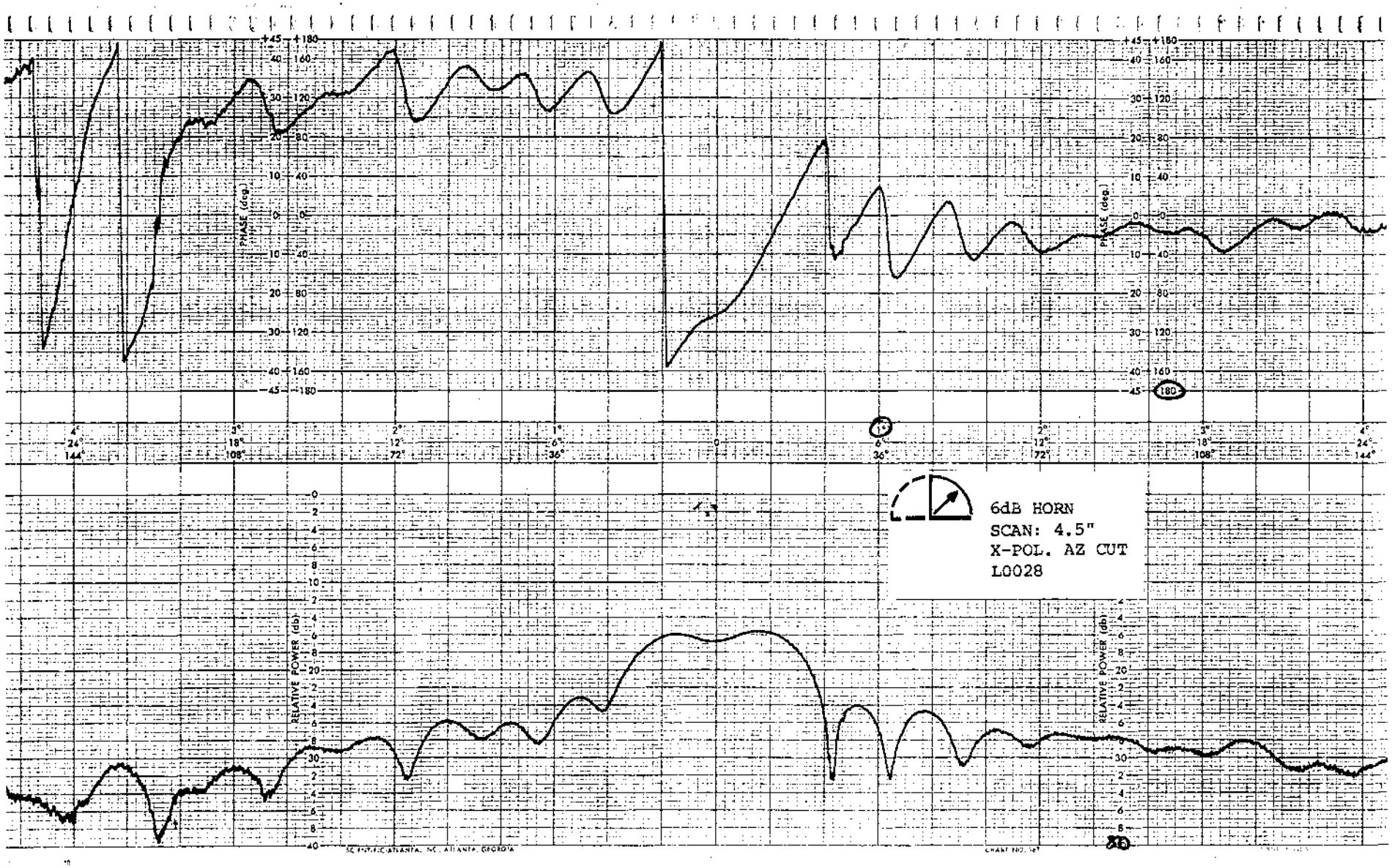

6dB HORN
SCAN: 0.0"
X-POL. EL CUT
L0006
PHASE (deg.)
RELATIVE POWER (db)

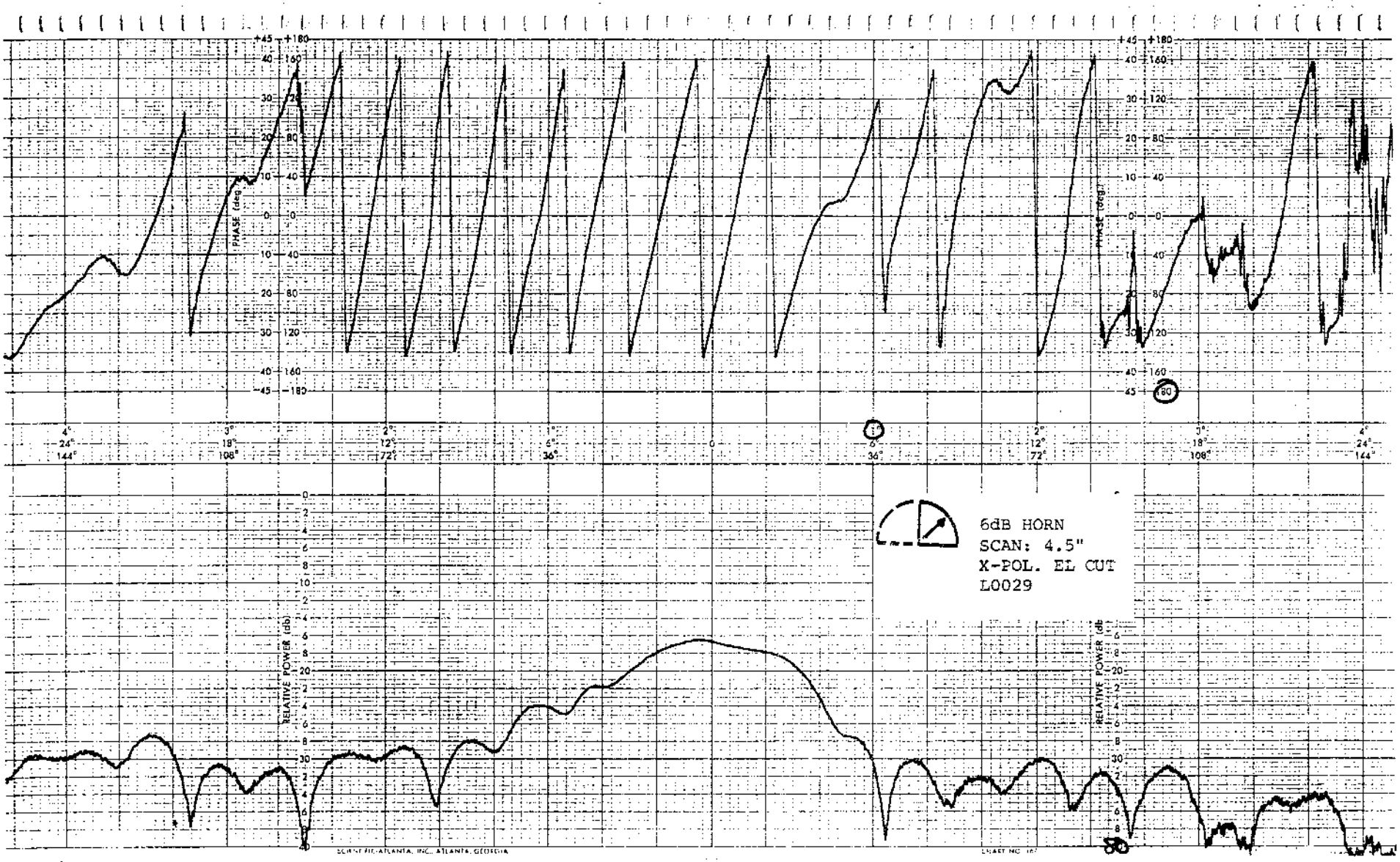

6dB HORN
SCAN: 4.5" IN
CO-POL. AZ CUT
L0027
PHASE (deg)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

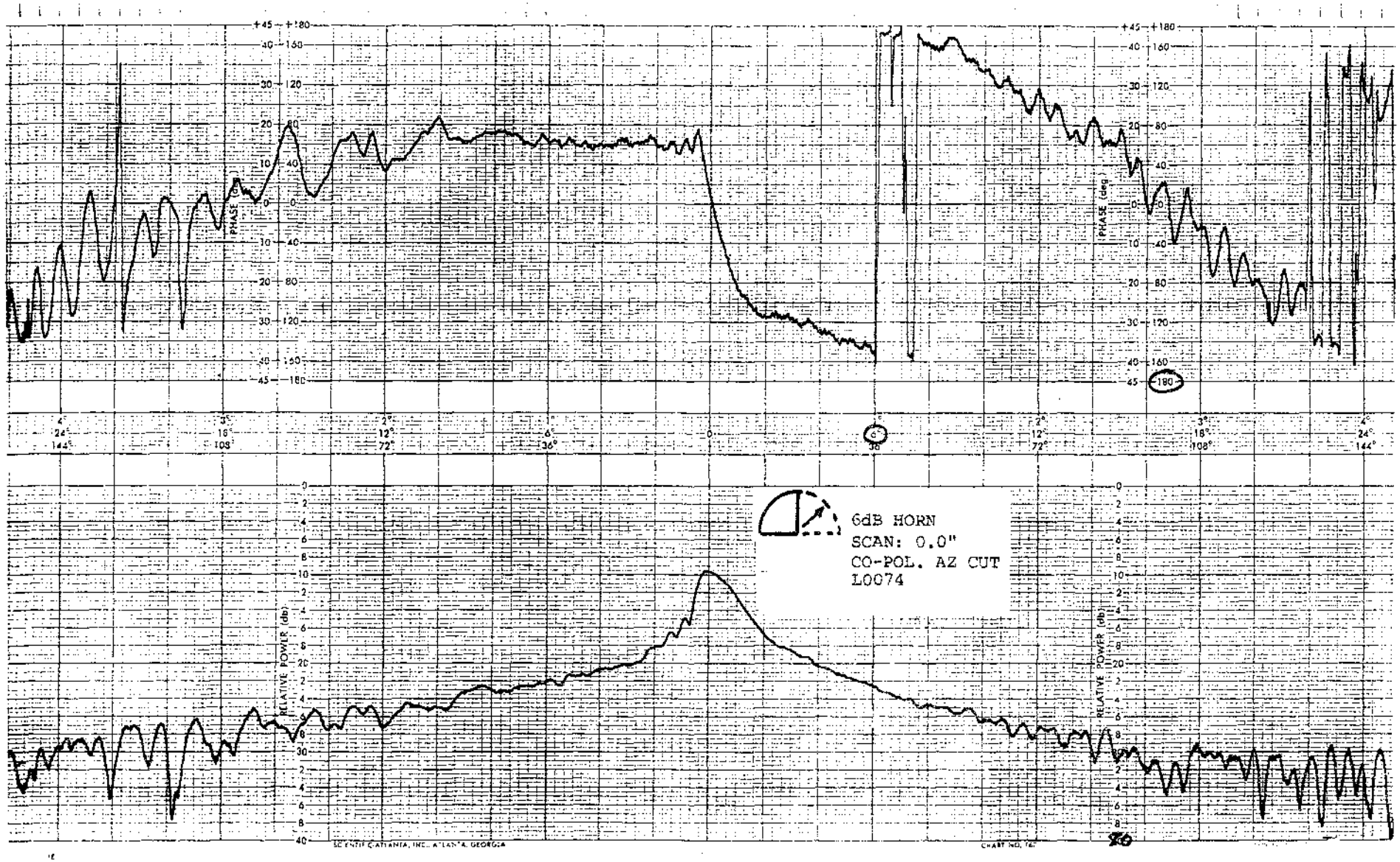

6dB HORN
SCAN: 4.5"
CO-POL. AZ CUT
L0025
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

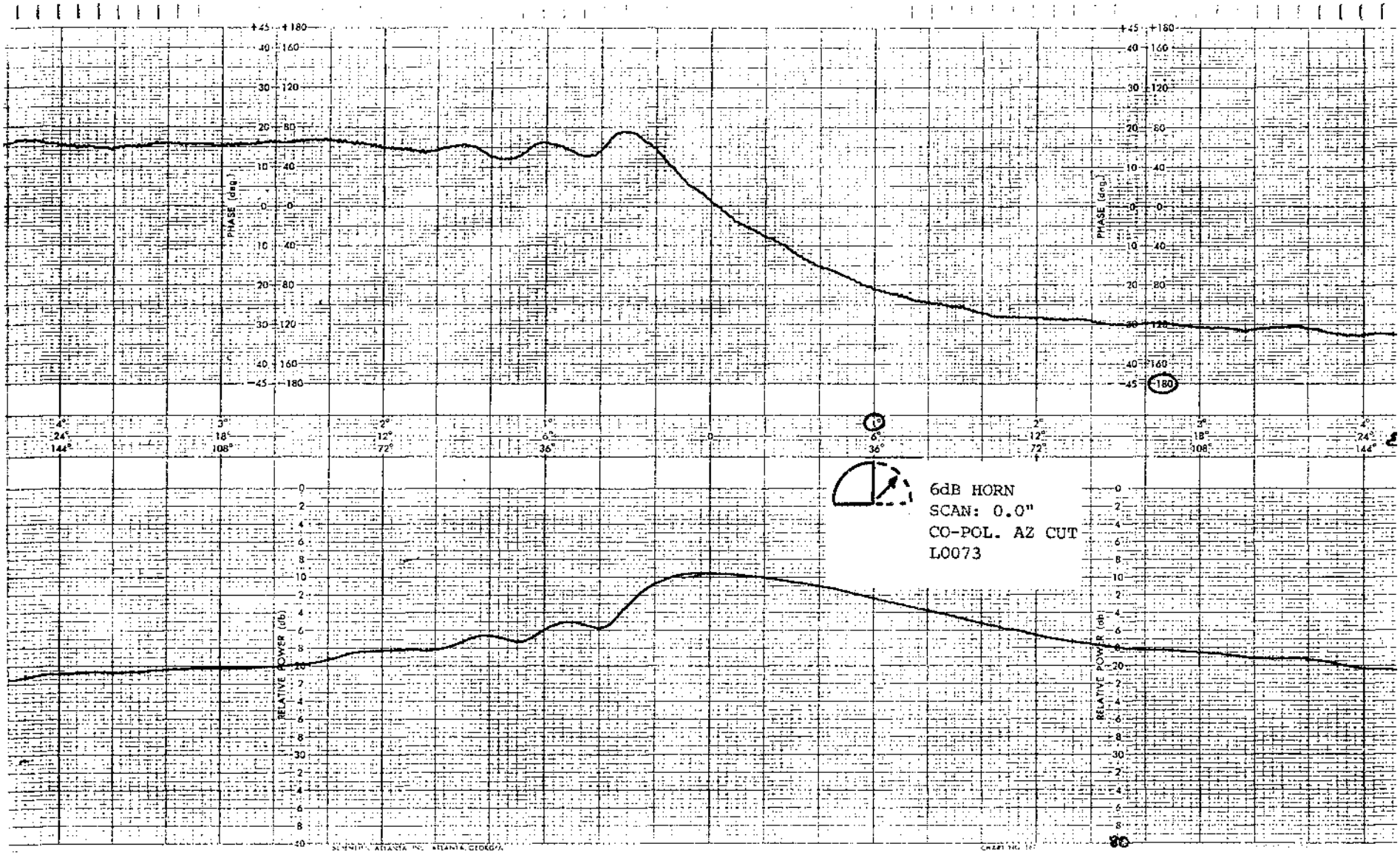

PHASE (deg.)
RELATIVE POWER (db)
6dB HORN
SCAN: 4.5"
CO-POL. EL CUT
LC026

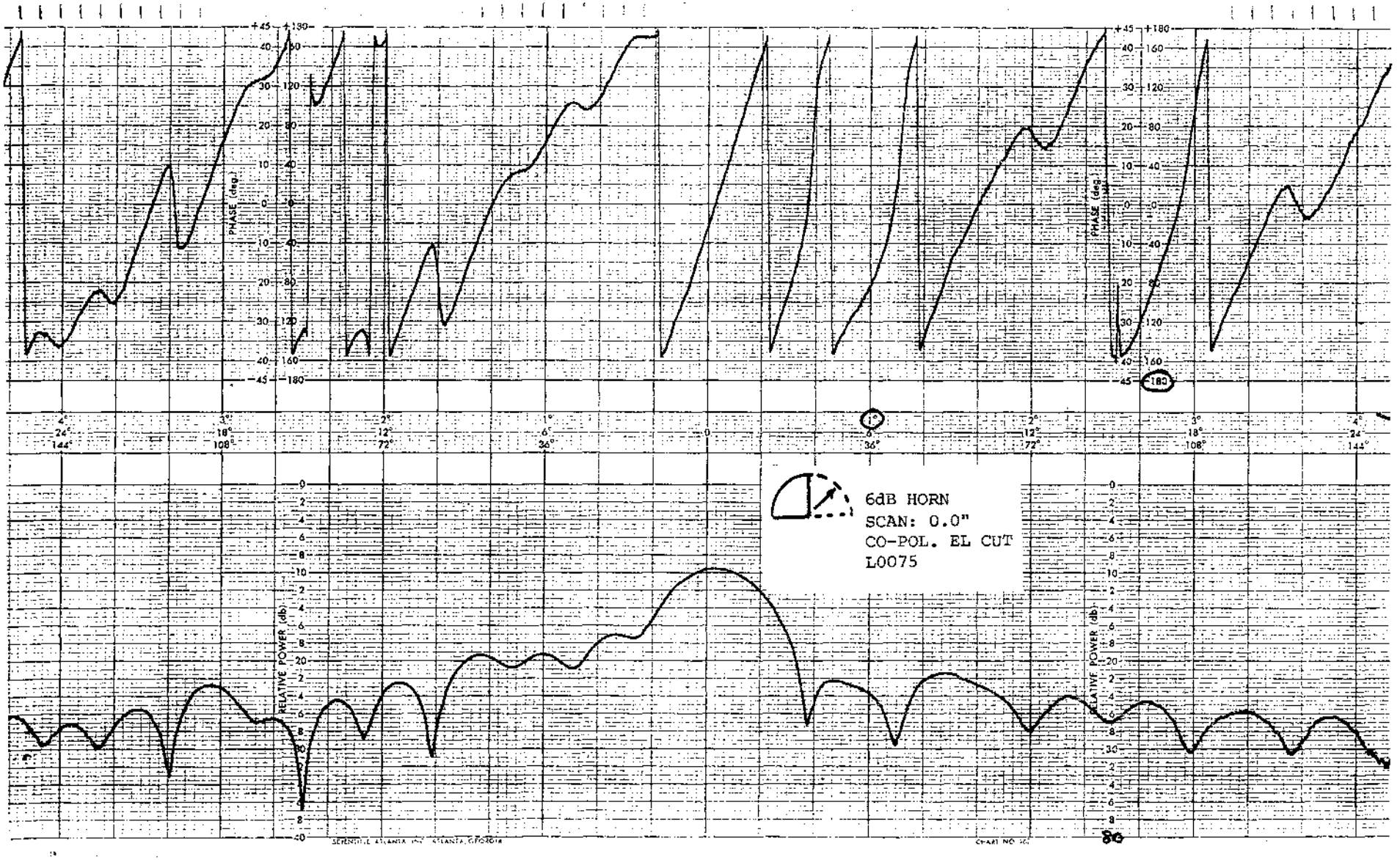

6dB HORN
SCAN: 4.5" IN
X-POL. AZ CUT
L0030
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC. ATLANTA, GEORGIA

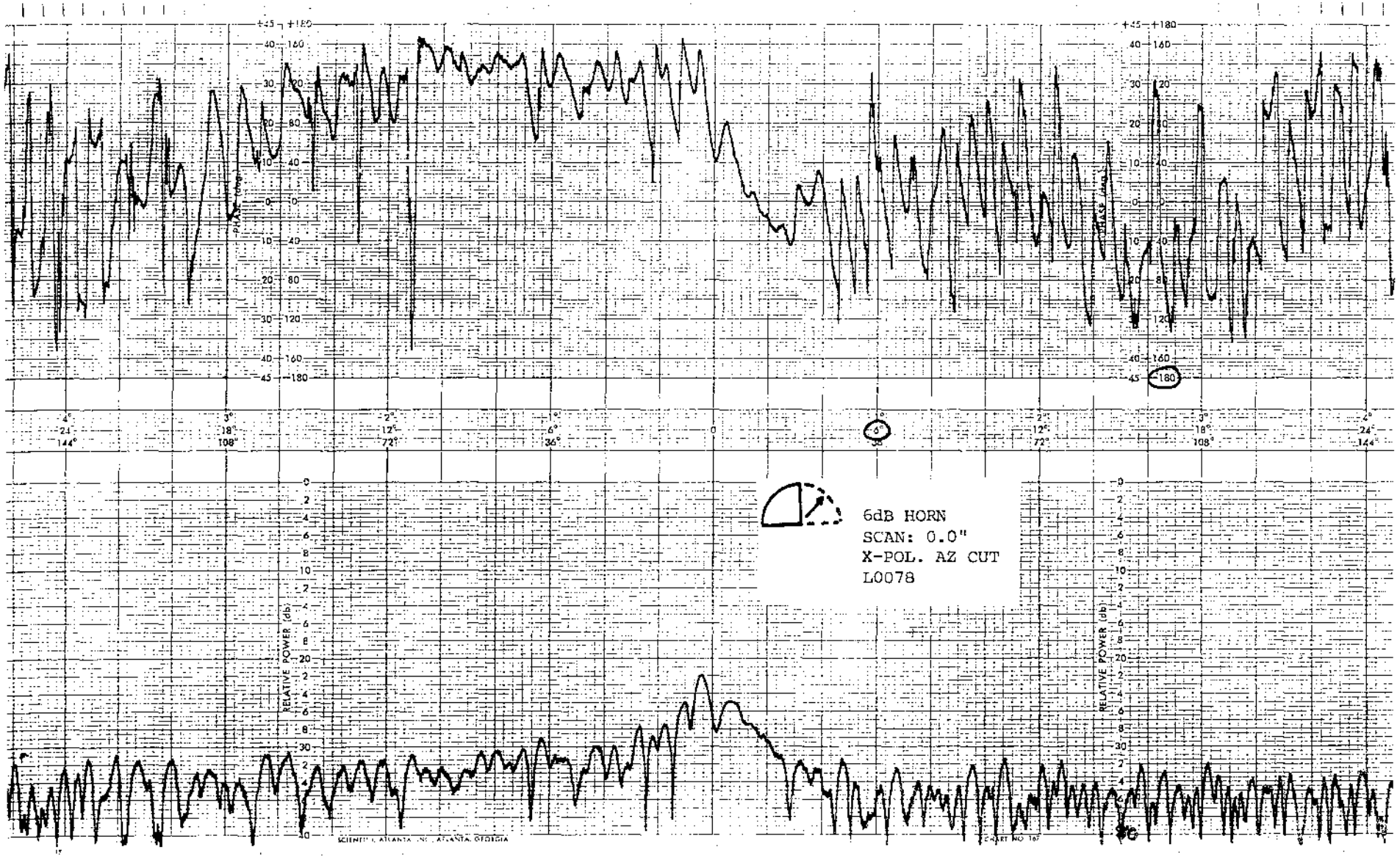

PHASE (deg.)
RELATIVE POWER (db)
6dB HORN
SCAN: 4.5"
X-POL. AZ CUT
L0028

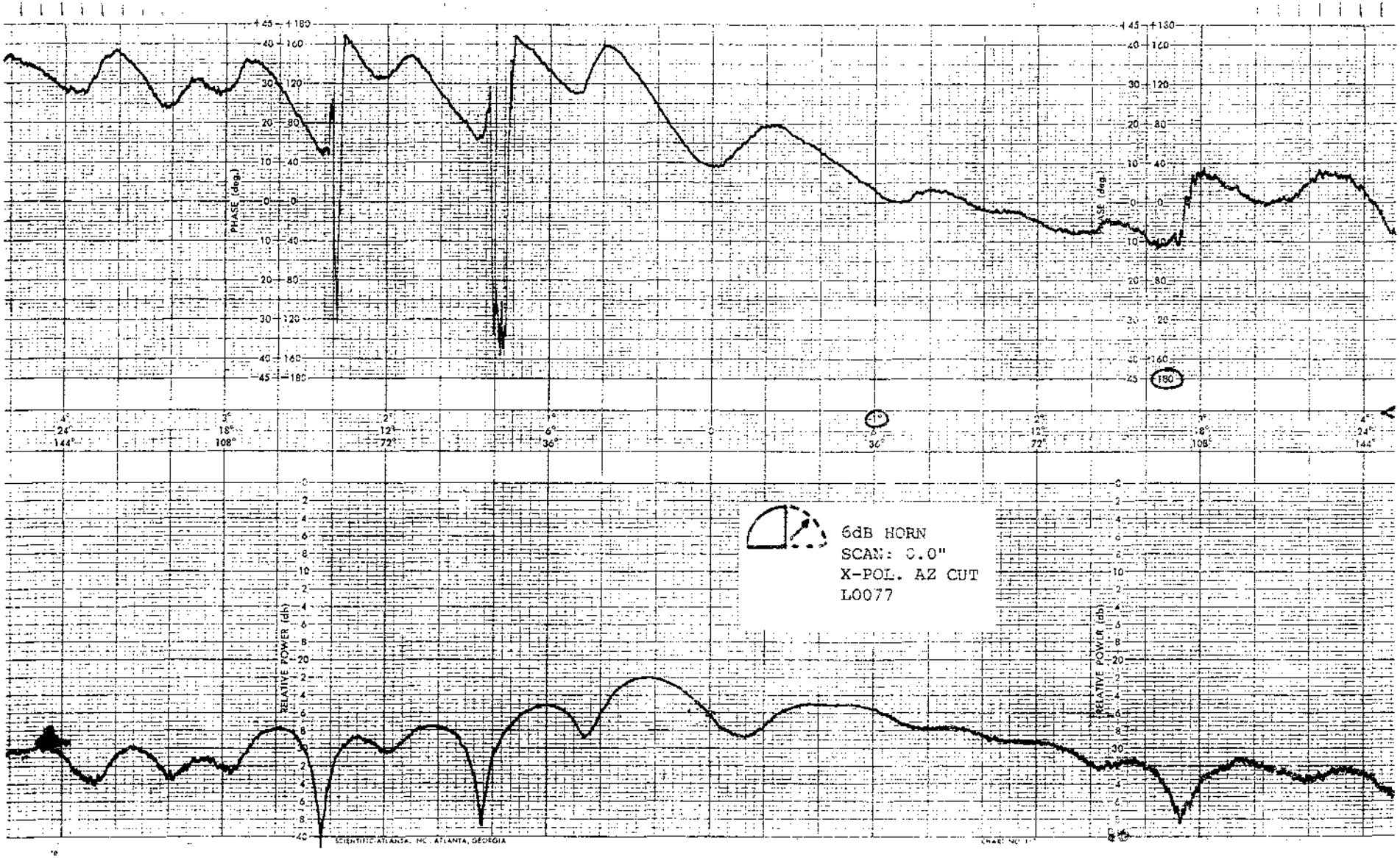

PHASE (deg)
RELATIVE POWER (db)
6dB HORN
SCAN: 4.5"
X-POL. EL CUT
L0029

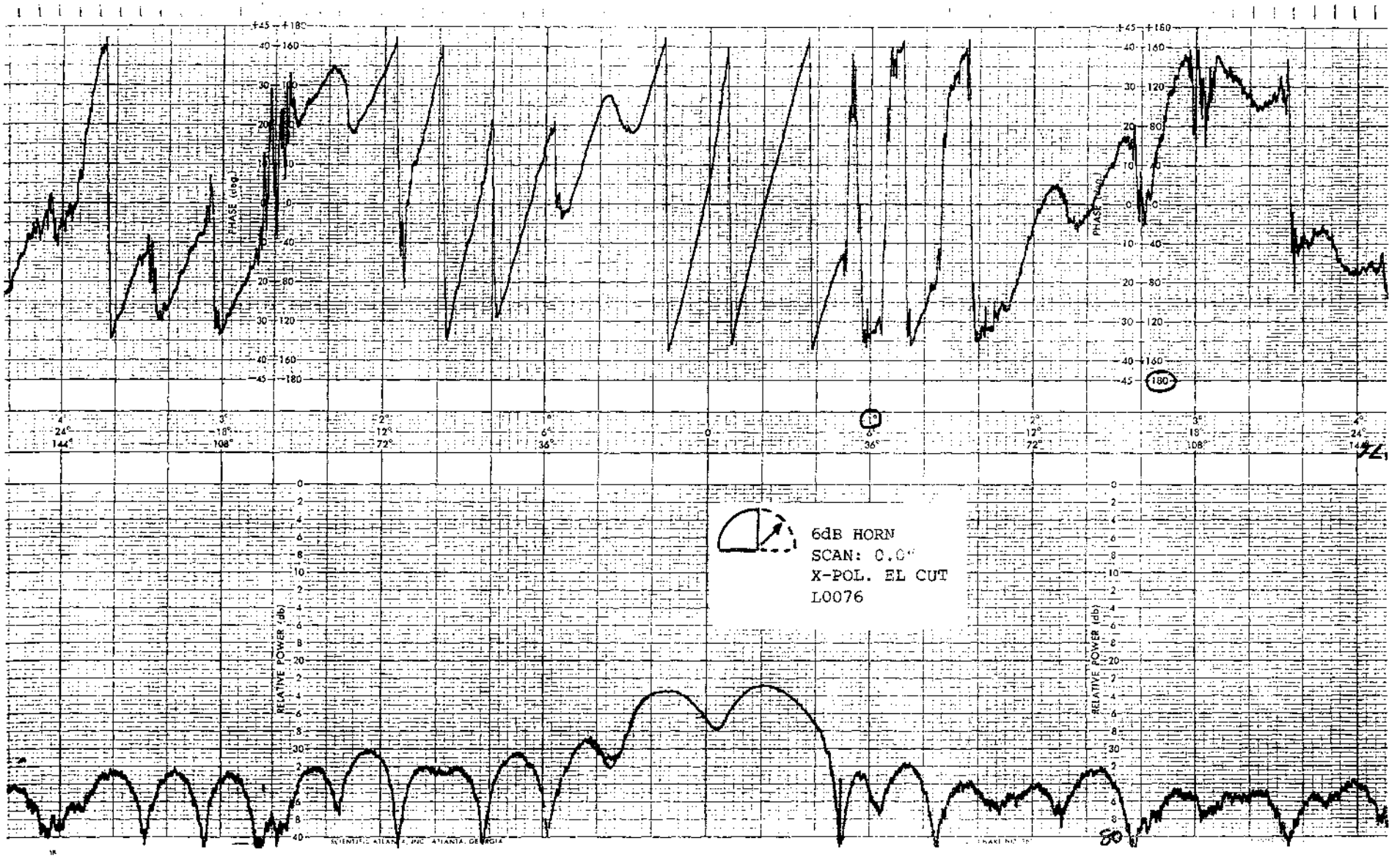

6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
L0074
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

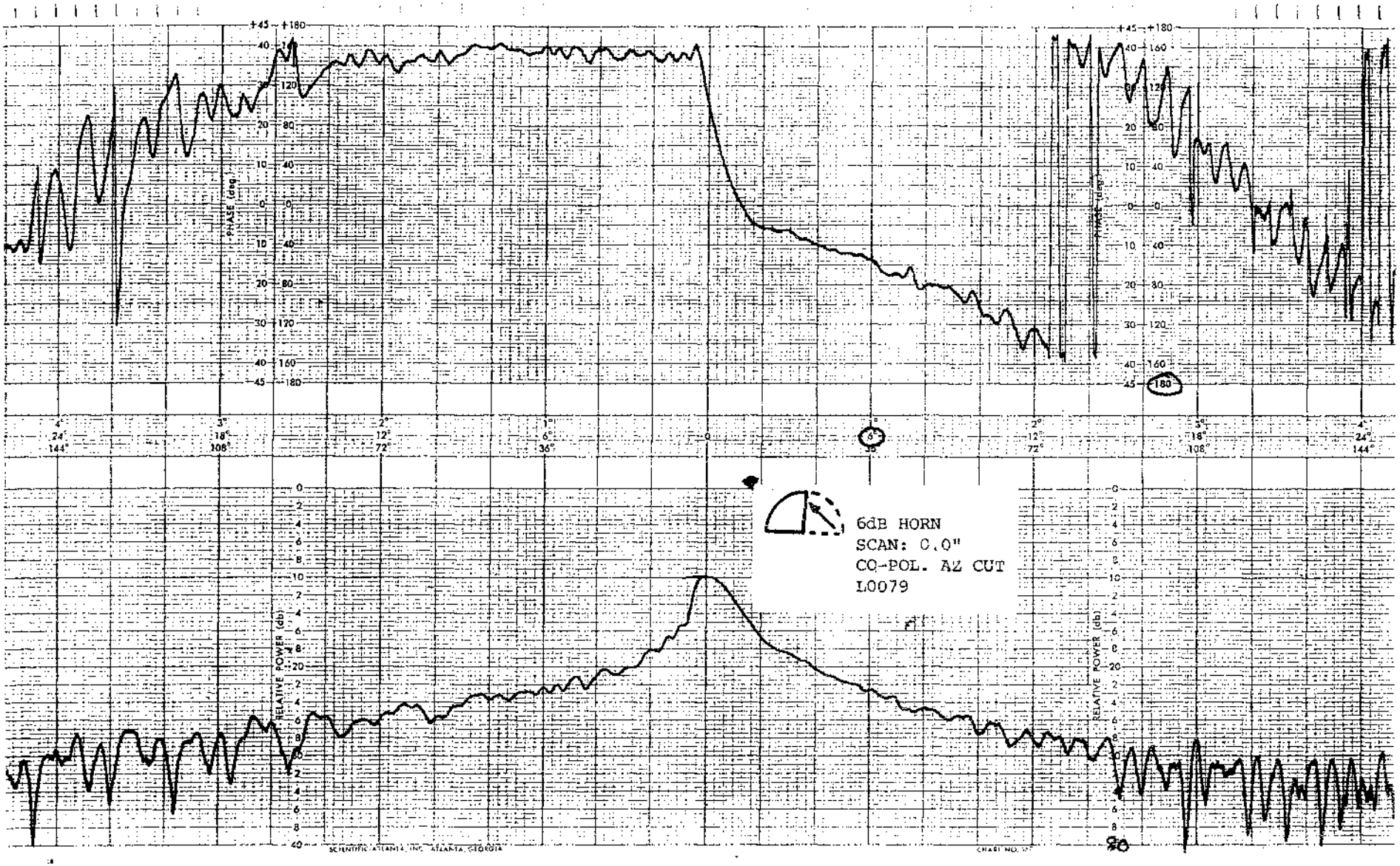

PHASE (deg)
RELATIVE POWER (db)
6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
L0073

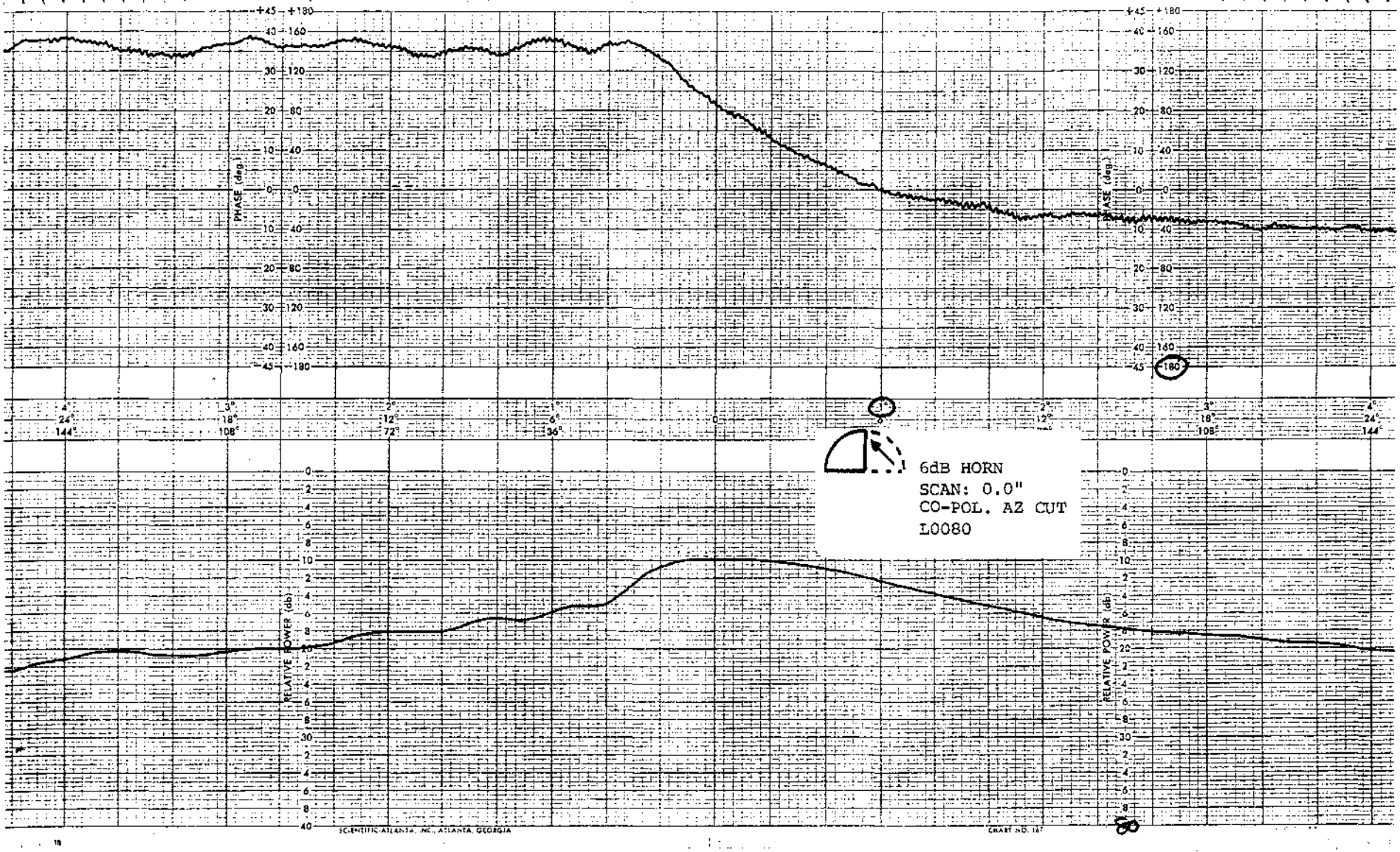

6dB HORN
SCAN: 0.0"
CO-POL. EL CUT
L0075
PHASE (deg.)
RELATIVE POWER (db)

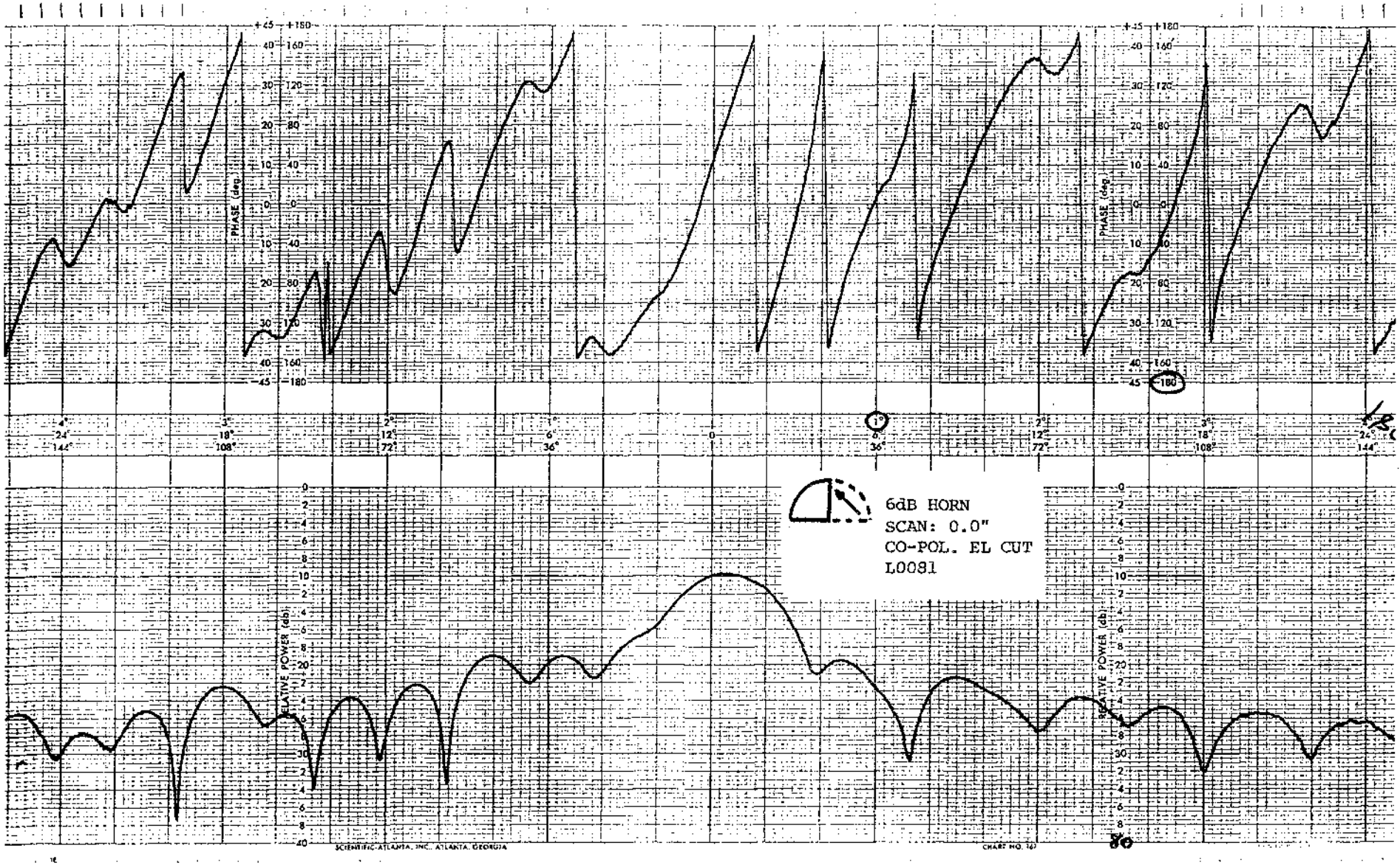

6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
L0078
RELATIVE POWER (db)

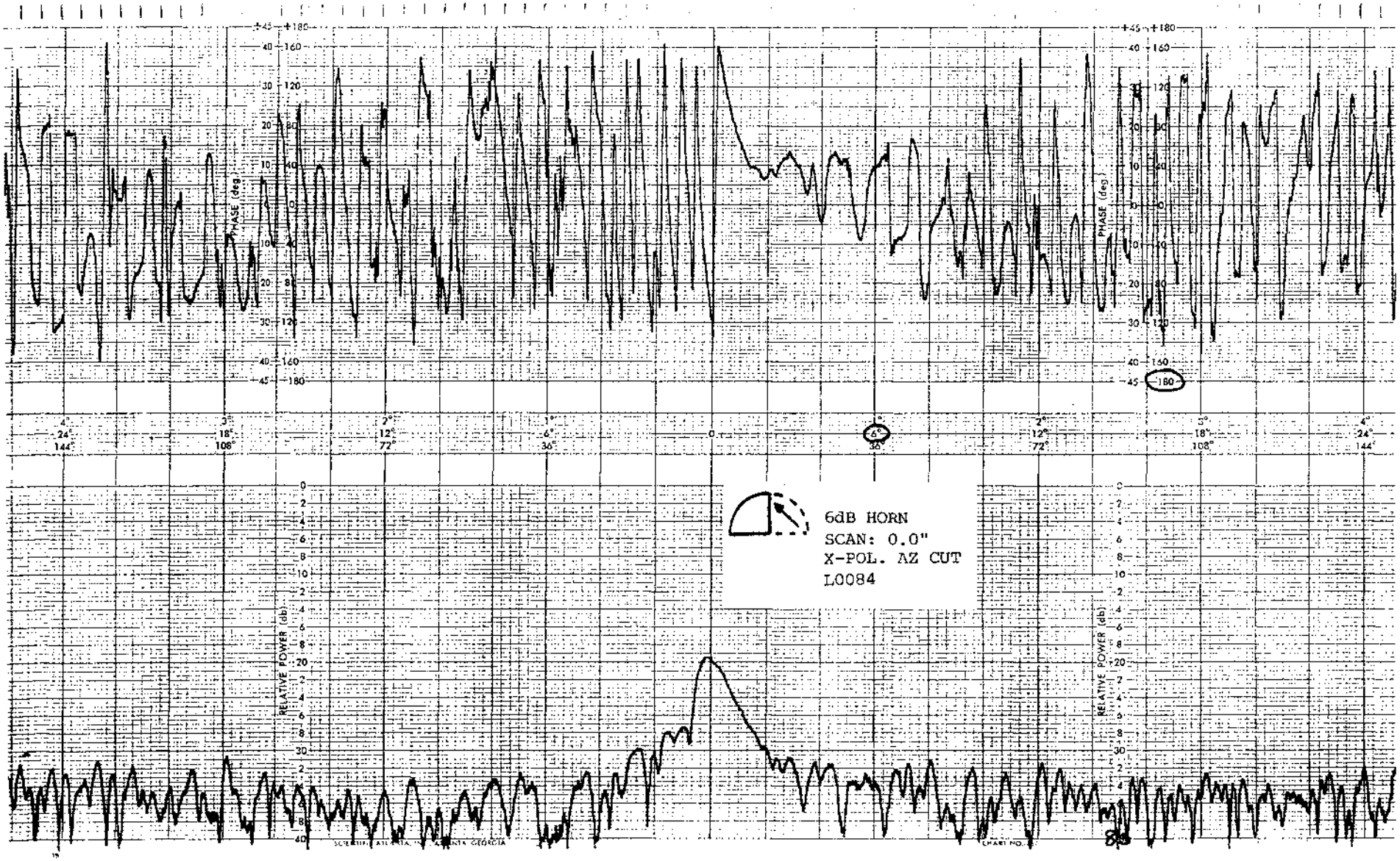

PHASE (deg.)
RELATIVE POWER (db)
6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
L0077
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

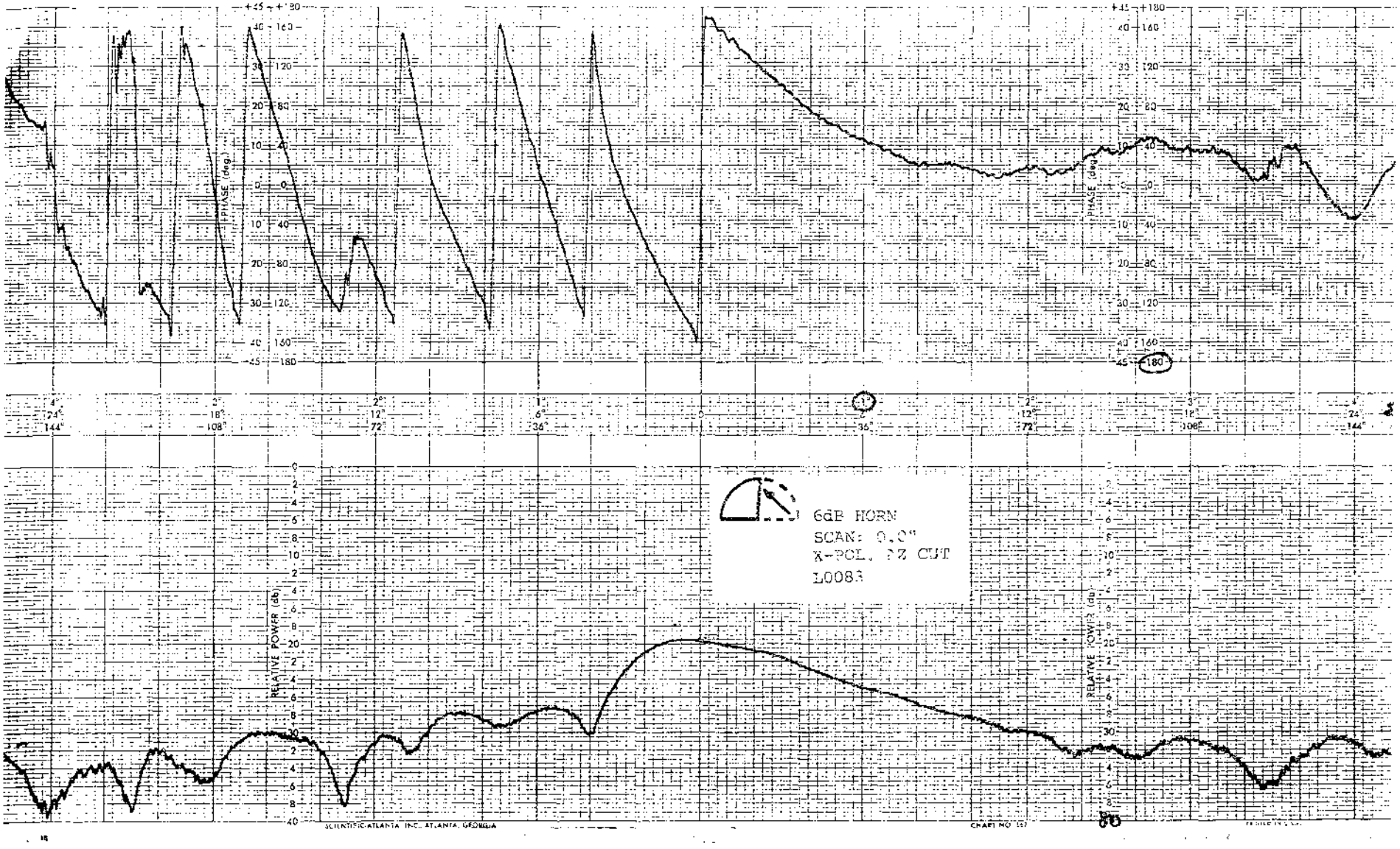

PHASE (deg)
RELATIVE POWER (db)
6dB HORN
SCAN: 0.0°
X-POL. EL CUT
L0076

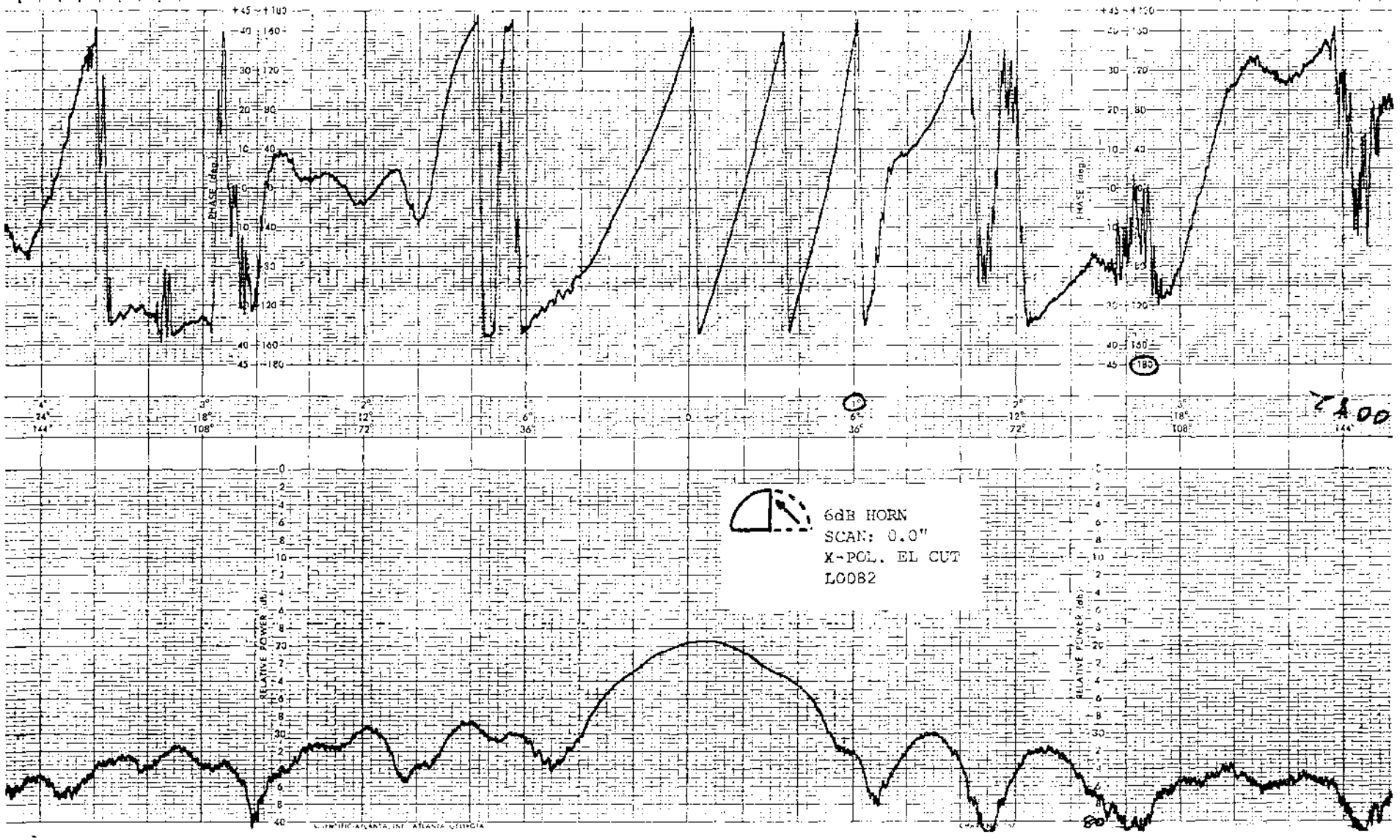

6dB HORN
SCAN: C.O"
CO-POL. AZ CUT
L0079
PHASE (deg)
RELATIVE POWER (db)

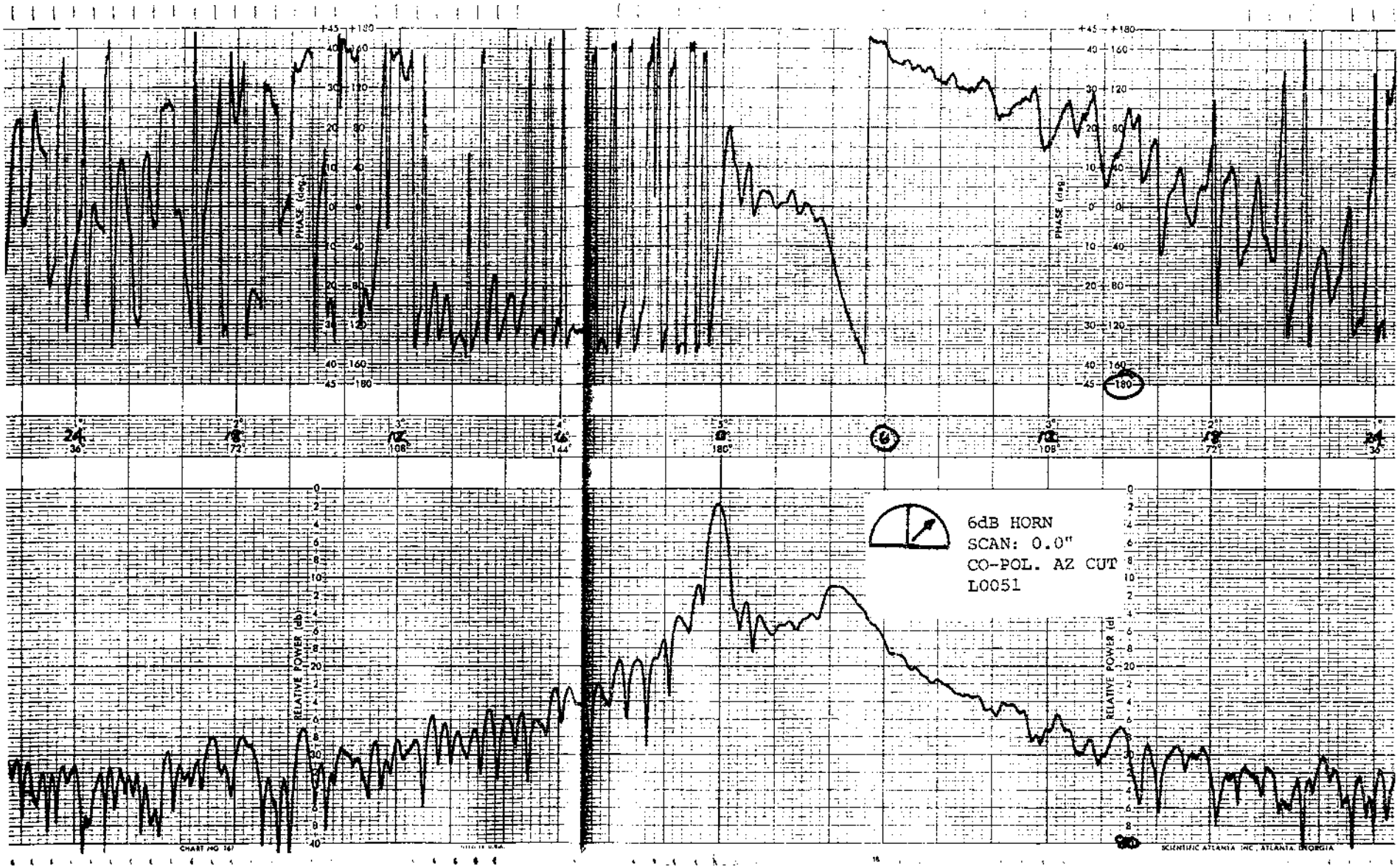

6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
L0080
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

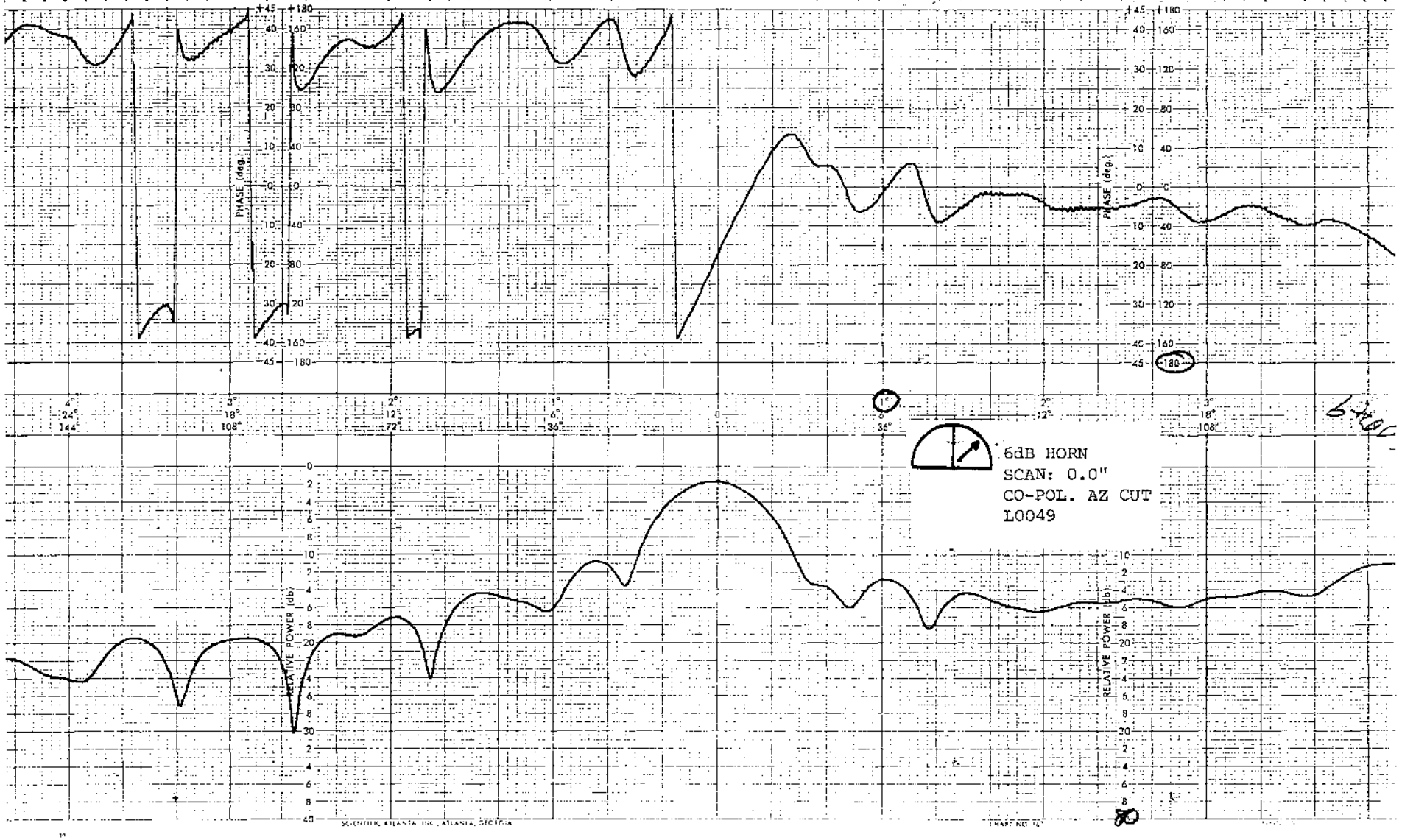

6dB HORN
SCAN: 0.0"
CO-POL. EL CUT
L0081
PHASE (deg)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

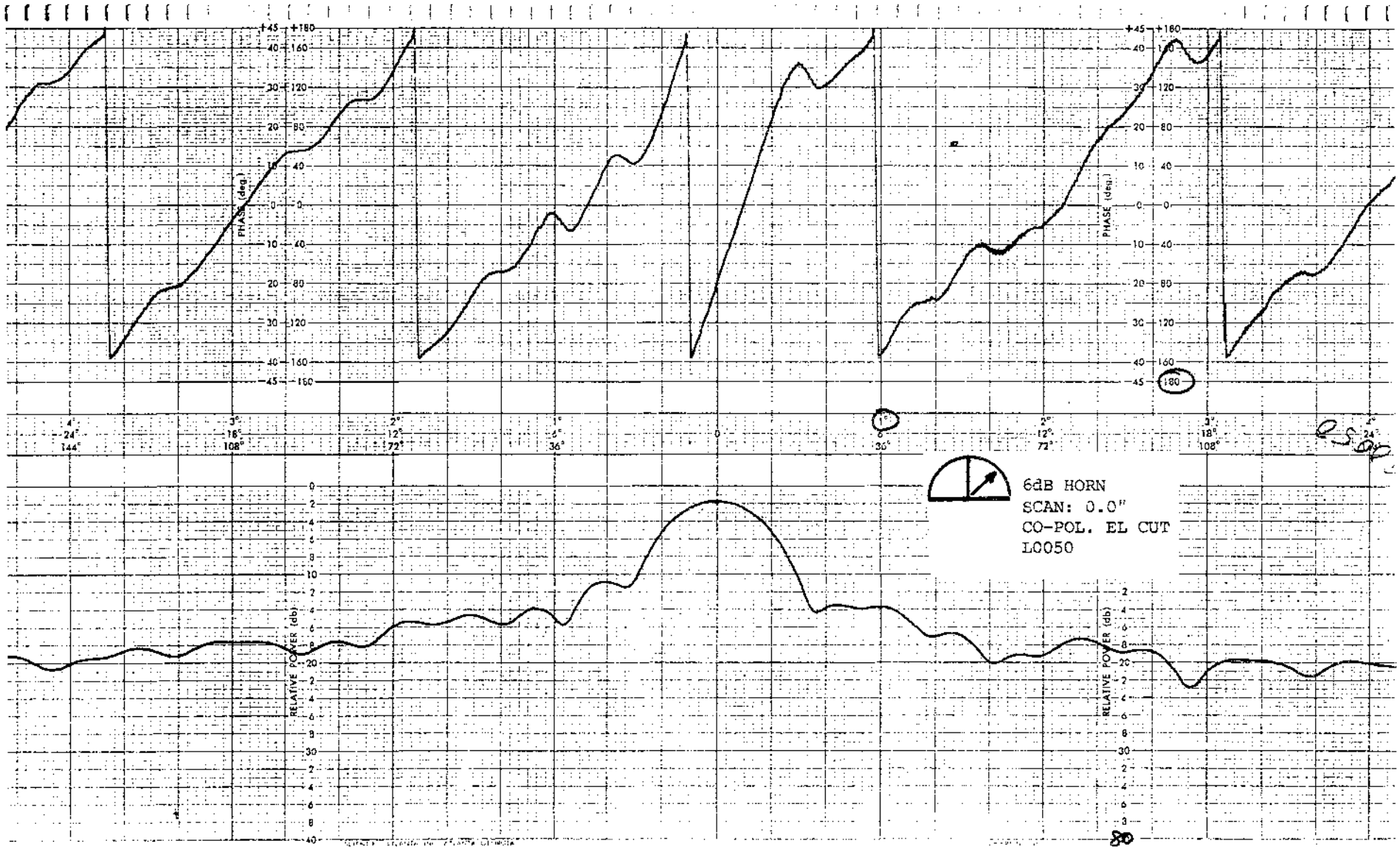

PHASE (deg)
RELATIVE POWER (db)
6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
L0084

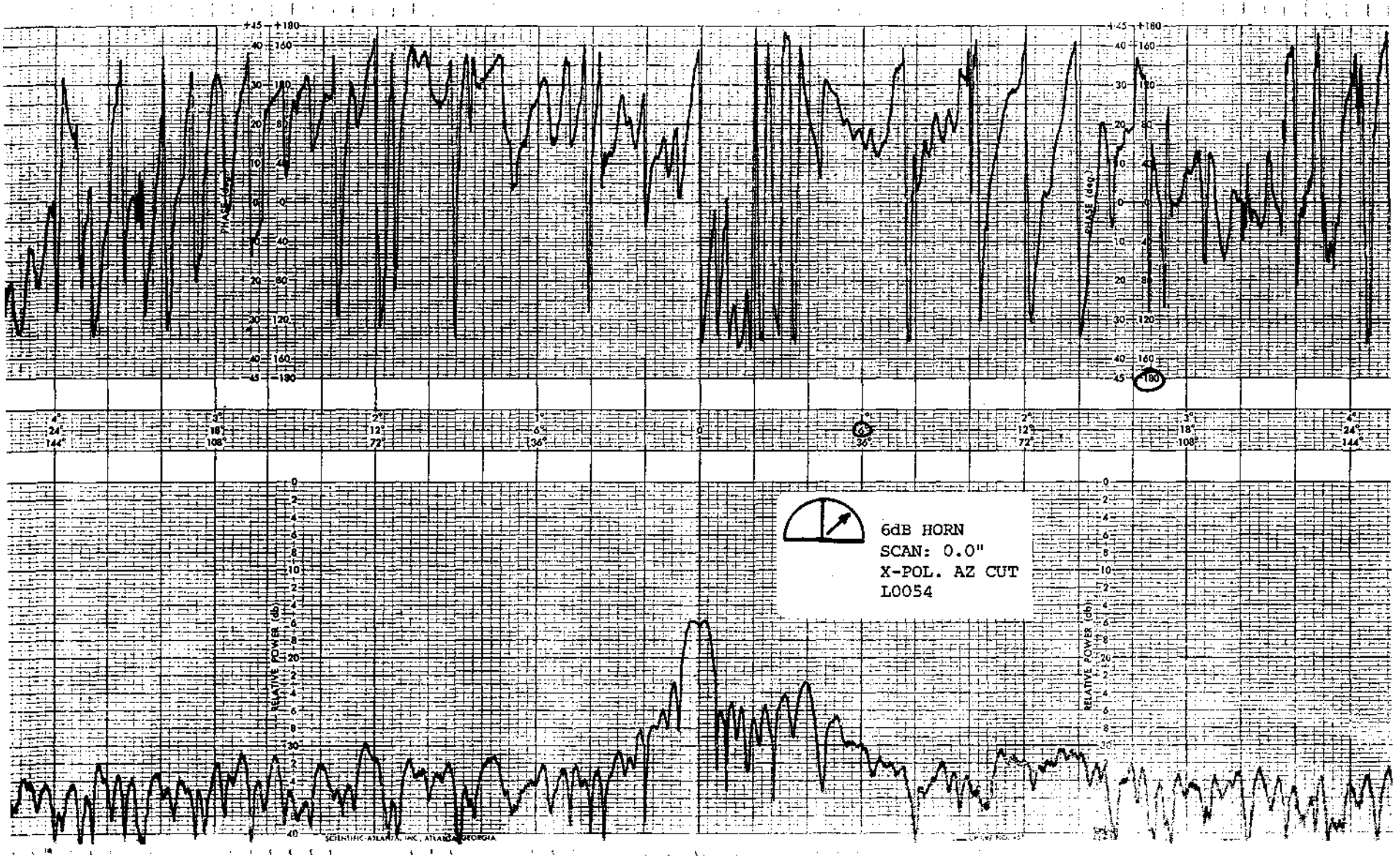

PHASE (deg.)
RELATIVE POWER (db)
6dB HORN
SCAN: 0.0°
X-POL, PZ CUT
L0083
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

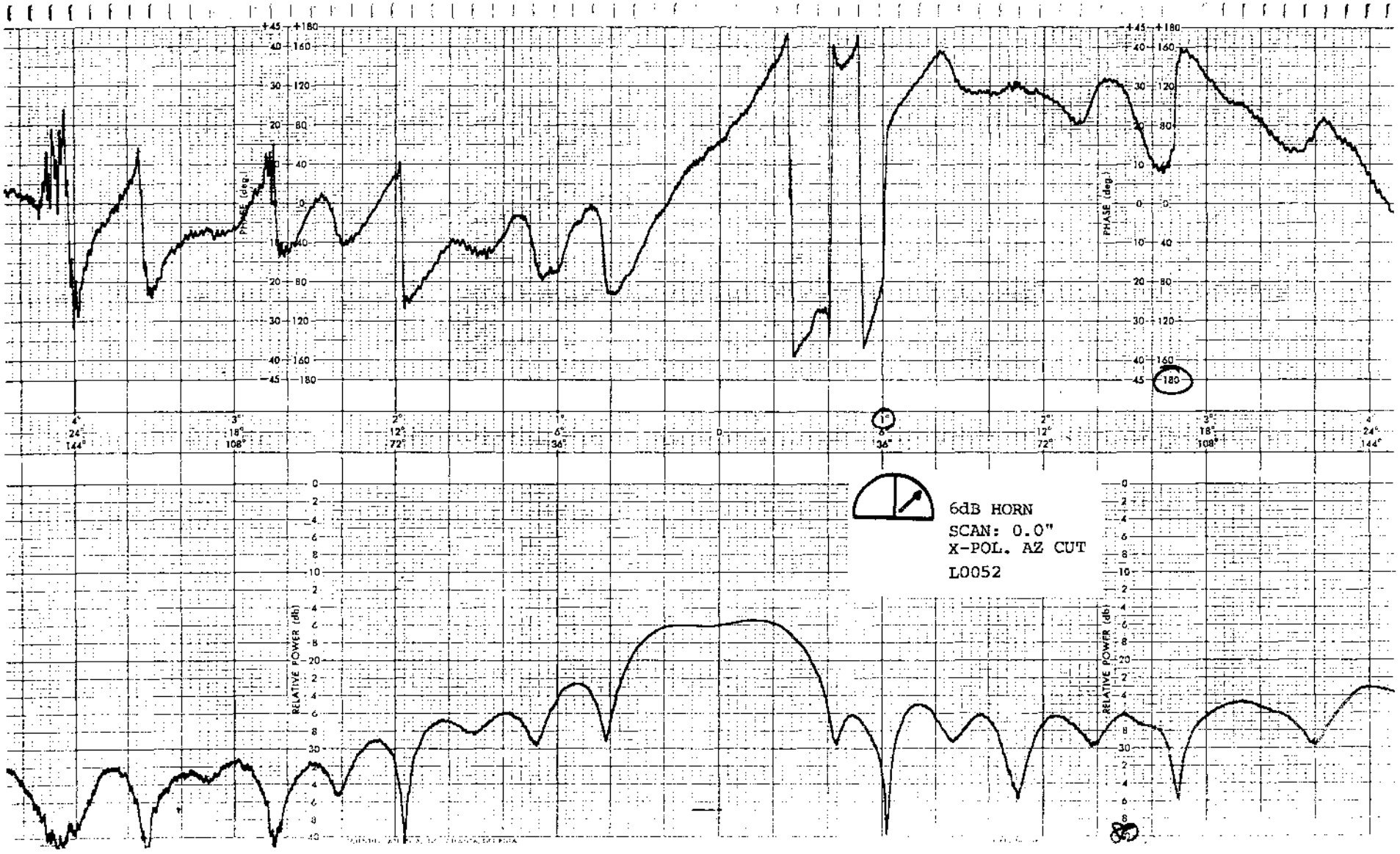

6dB HORN
SCAN: 0.0"
X-POL. EL CUT
L0082
RELATIVE POWER (db)
PHASE (deg.)

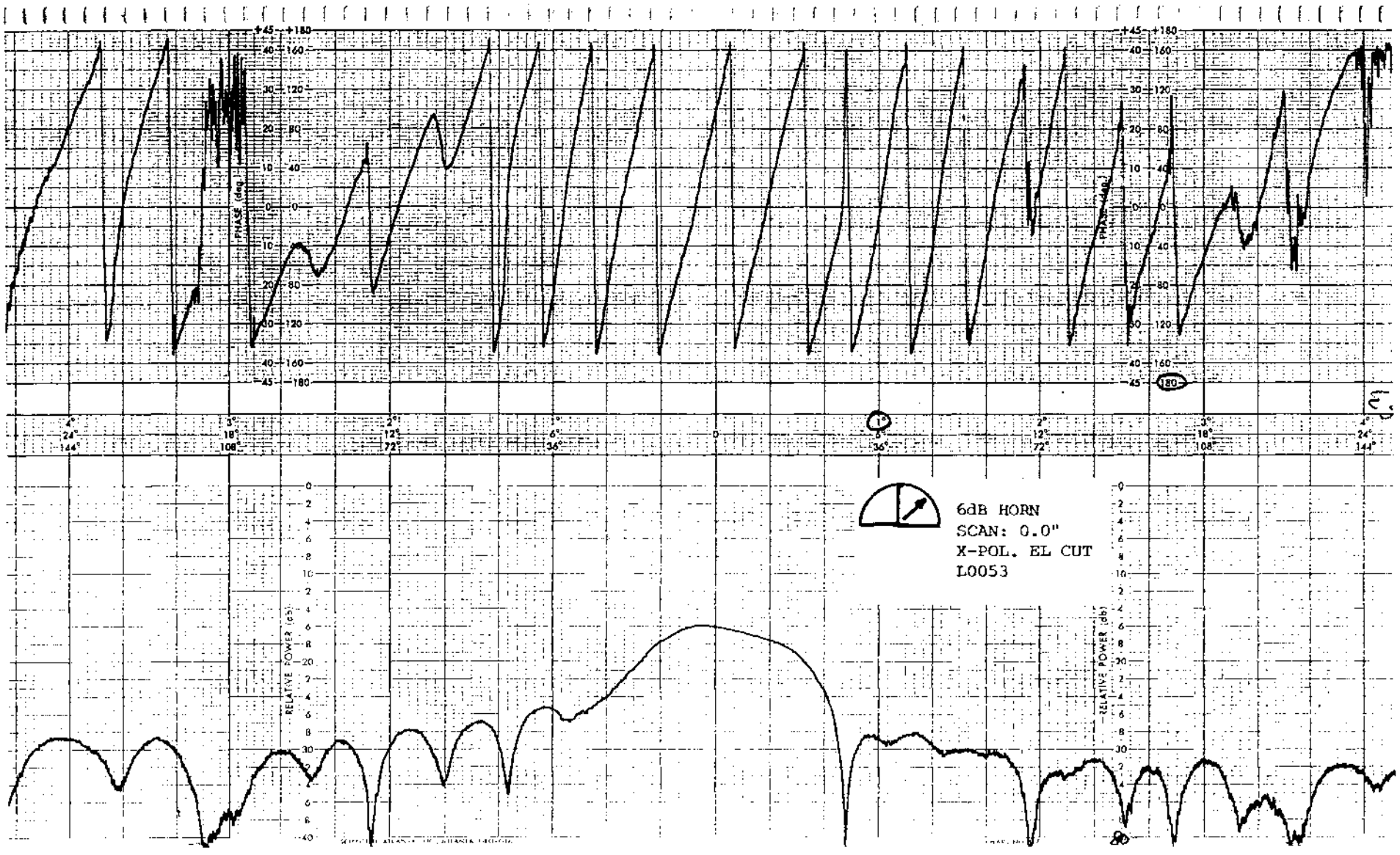

6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
L0051
PHASE (deg.)
RELATIVE POWER (dB)
SCIENTIFIC ATLANTA INC., ATLANTA, GEORGIA


PHASE (deg.)
RELATIVE POWER (db)
6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
L0049


PHASE (deg.)
RELATIVE POWER (db)
6dB HORN
SCAN: 0.0"
CO-POL. EL CUT
L0050


6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
L0054
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

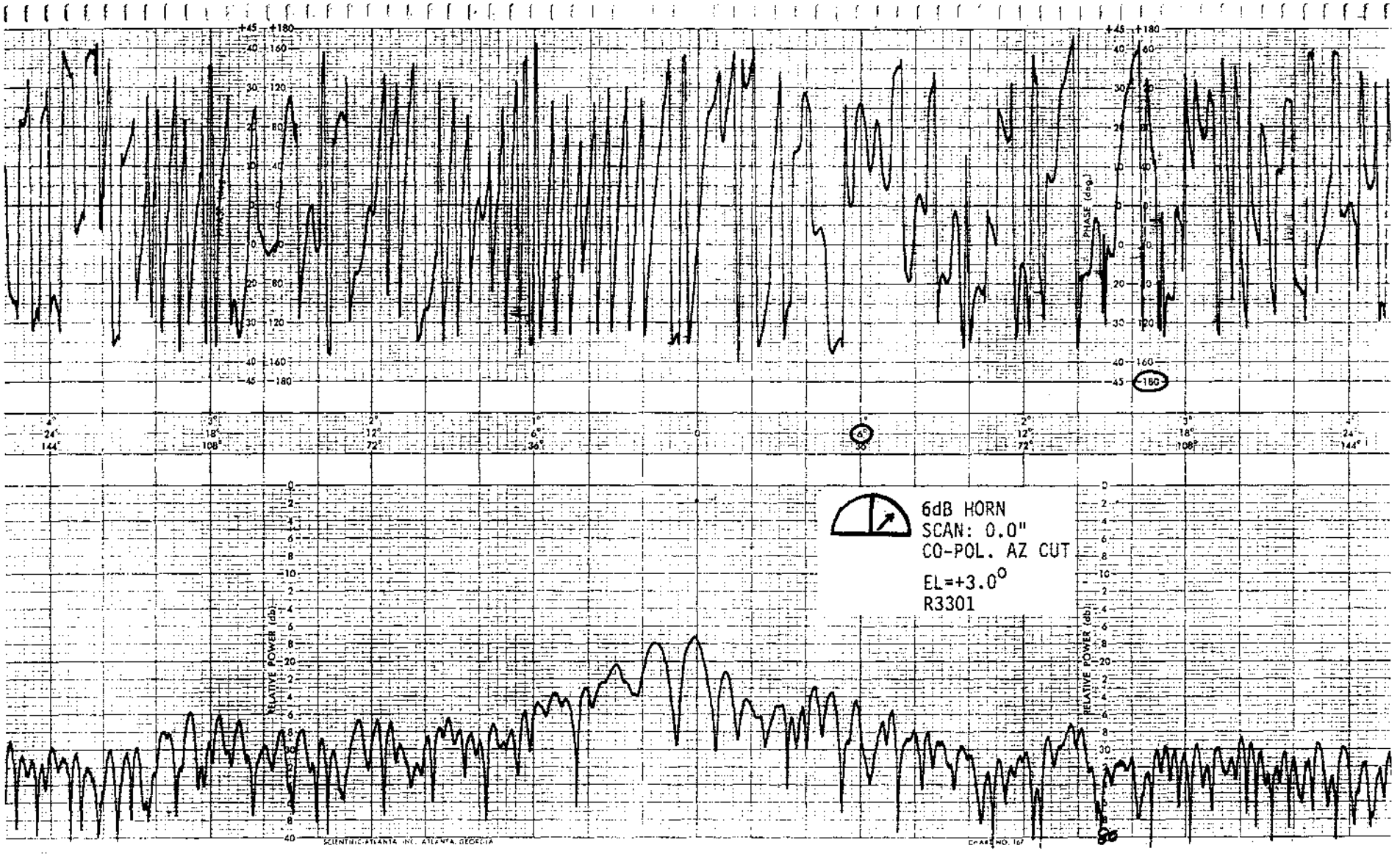

PHASE (deg.)
RELATIVE POWER (db)
6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
L0052

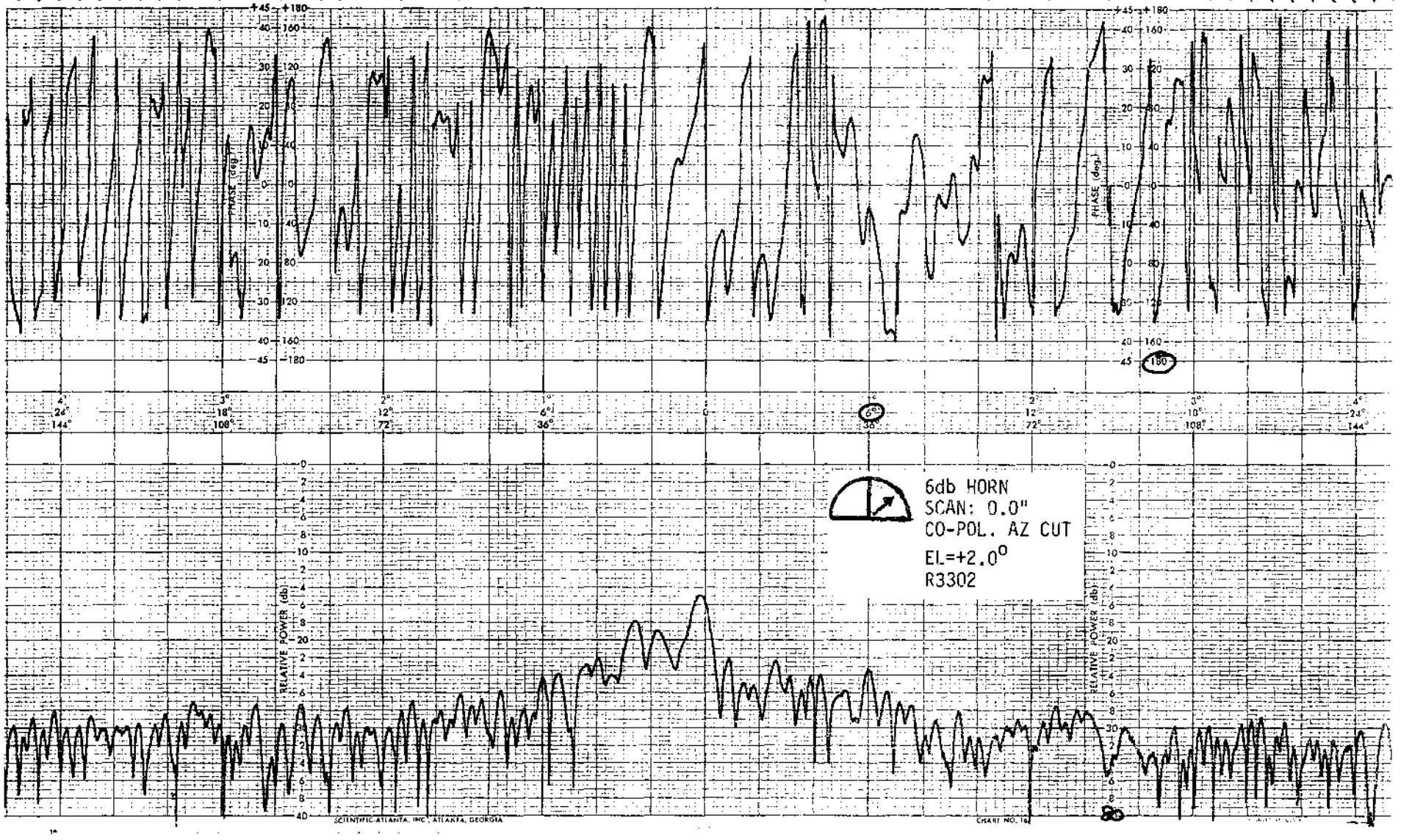

6dB HORN
SCAN: 0.0"
X-POL. EL CUT
L0053
PHASE (deg)
RELATIVE POWER (dB)

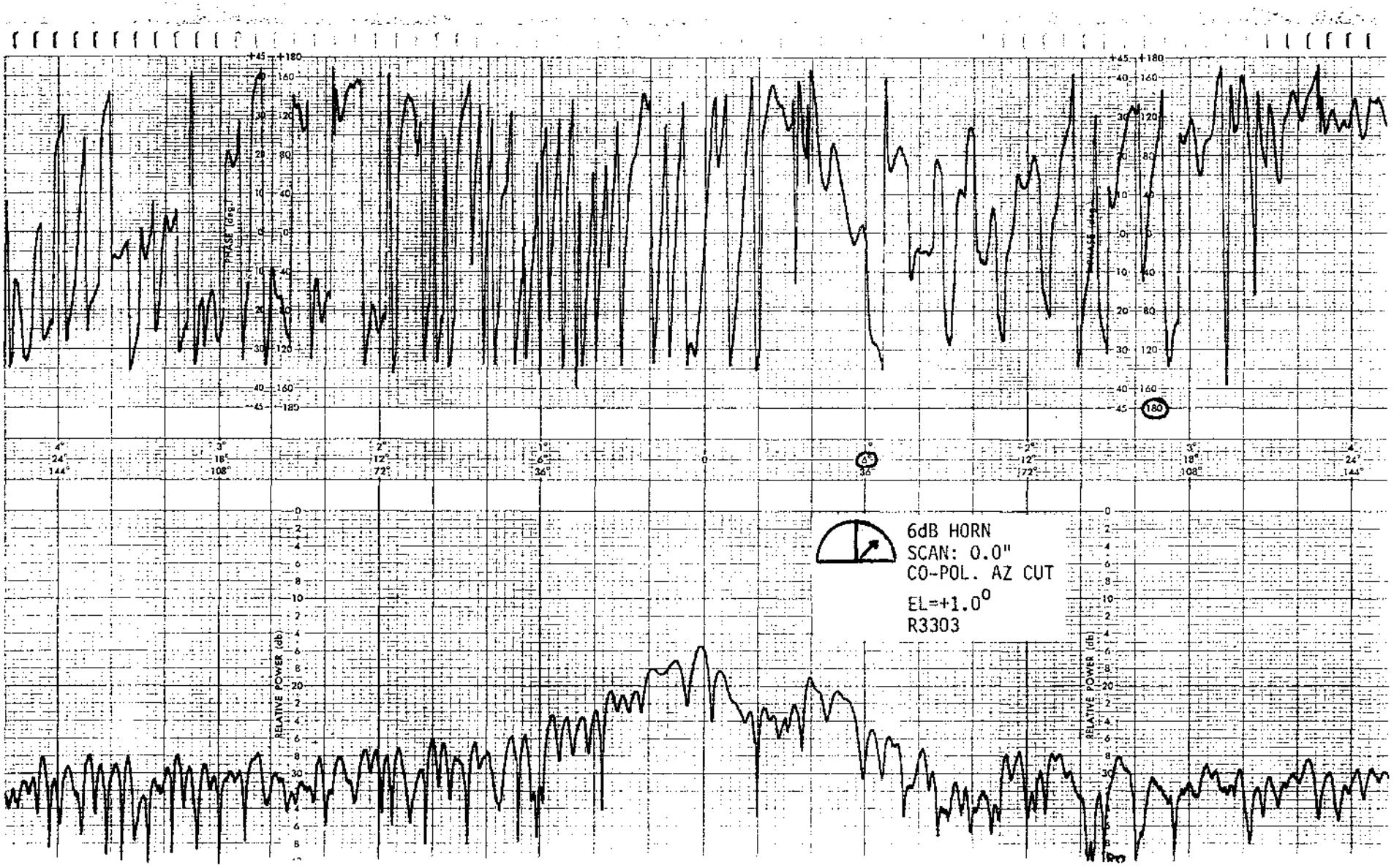
LSST - V

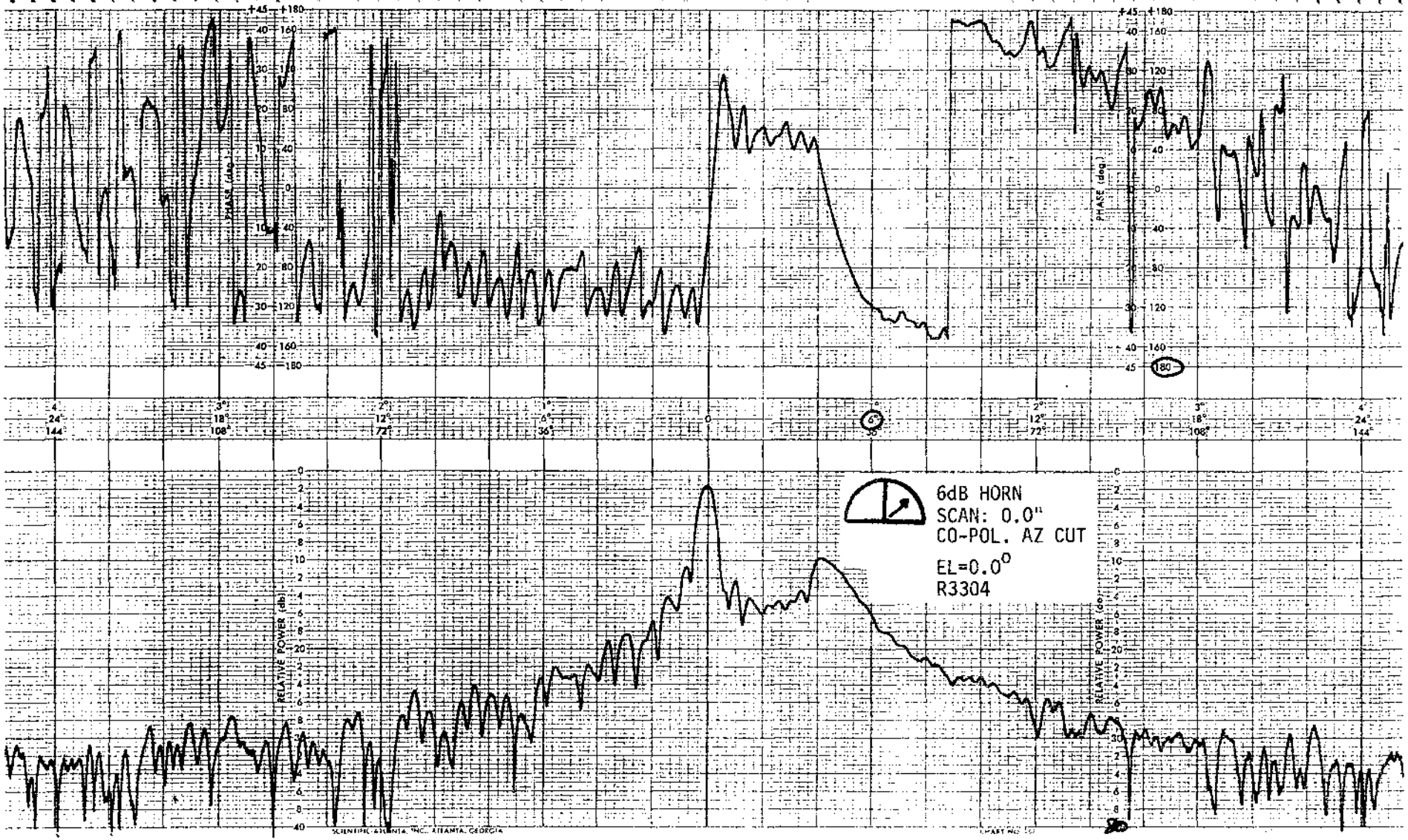
SECONDARY PATTERN LOG

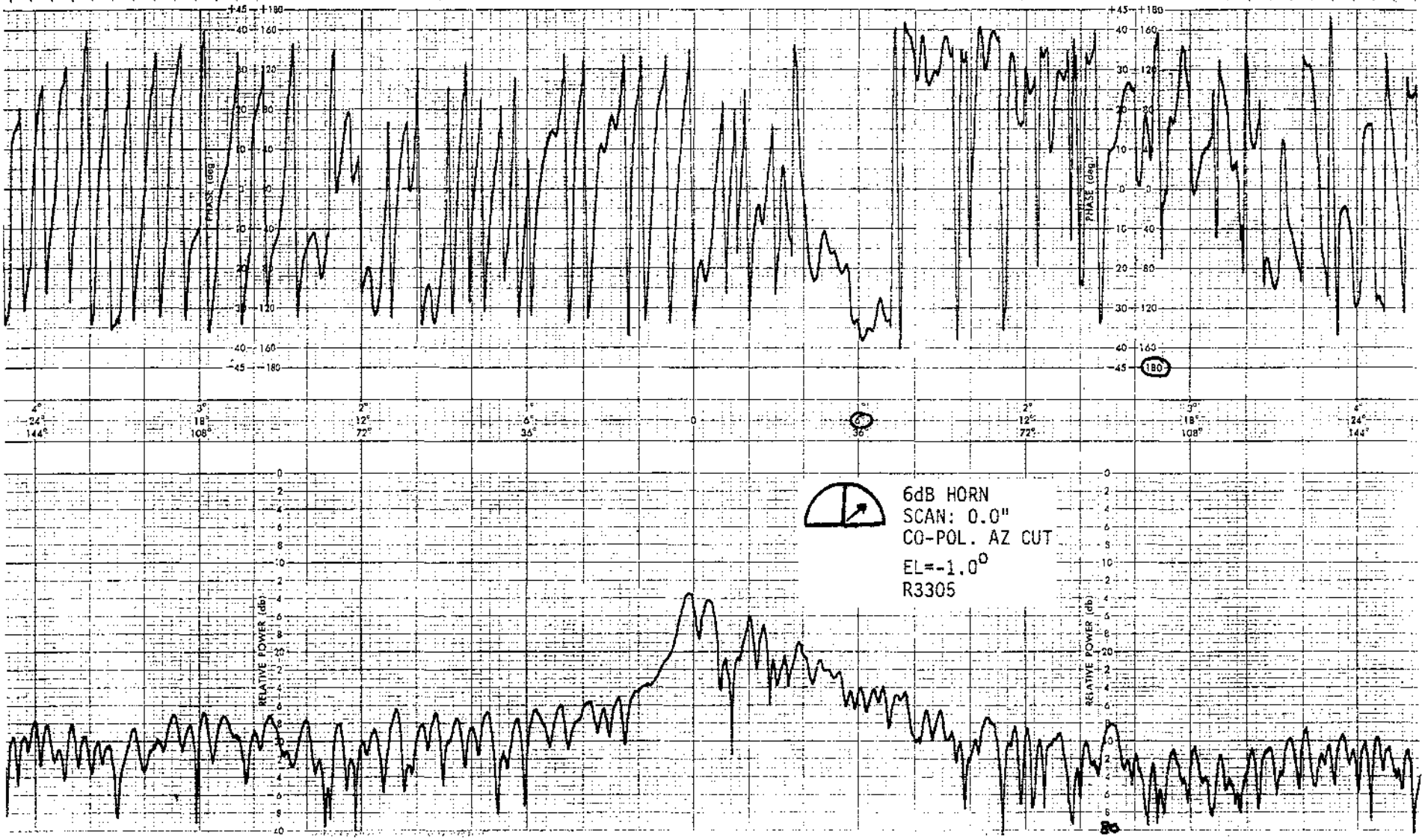
CONFIGURATION	HORN	SCAN	POL.	PK. GAIN	PATTERN	FILE NAME	PAGE NUMBER
	6 dB	0.0	CO	-	+3°EL ± 45°AZ	R3301	151
	"	"	"	-	+2°EL "	R3302	152
	"	"	"	-	+1°EL "	R3303	153
	"	"	"	50.75	0°EL "	R3304	154
	"	"	"	-	-1°EL "	R3305	155
	"	"	"	-	-2°EL "	R3306	156
	"	"	"	-	-3°EL "	R3307	157
	6 dB	0.0	X	-	+3°EL ± 45°AZ	R3401	158
	"	"	"	-	+2°EL "	R3402	159
	"	"	"	-	+1°EL "	R3403	160
	"	"	"	-	0°EL "	R3404	161
	"	"	"	-	-1°EL "	R3405	162
	"	"	"	-	-2°EL "	R3406	163
	"	"	"	-	-3°EL "	R3407	164
	6 dB	4.5"	CO	50.45	±45° AZ	L0045	165
	"	"	CO	"	± 5° AZ	L0043	166
	"	"	CO	"	± 5° EL	L0044	167
	"	"	X	"	±45° AZ	L0048	168
	"	"	X	"	± 5° AZ	L0046	169
	"	"	X	"	± 5° EL	L0047	170
	6 dB	0.0	CO	-	+3°EL ± 45°AZ	R3101	171
	"	"	"	-	+2°EL "	R3102	172
	"	"	"	-	+1°EL "	R3103	173
	"	"	"	50.70	0°EL "	R3104	174
	"	"	"	-	-1°EL "	R3105	175
	"	"	"	-	-2°EL "	R3106	176
	"	"	"	-	-3°EL "	R3107	177
	6 dB	0.0	X	-	+3°EL ± 45°AZ	R3201	178
	"	"	"	-	+2°EL "	R3202	179
	"	"	"	-	+1°EL "	R3203	180
	"	"	"	-	0°EL "	R3204	181
	"	"	"	-	-1°EL "	R3205	182
	"	"	"	-	-2°EL "	R3206	183
	"	"	"	-	-3°EL "	R3207	184

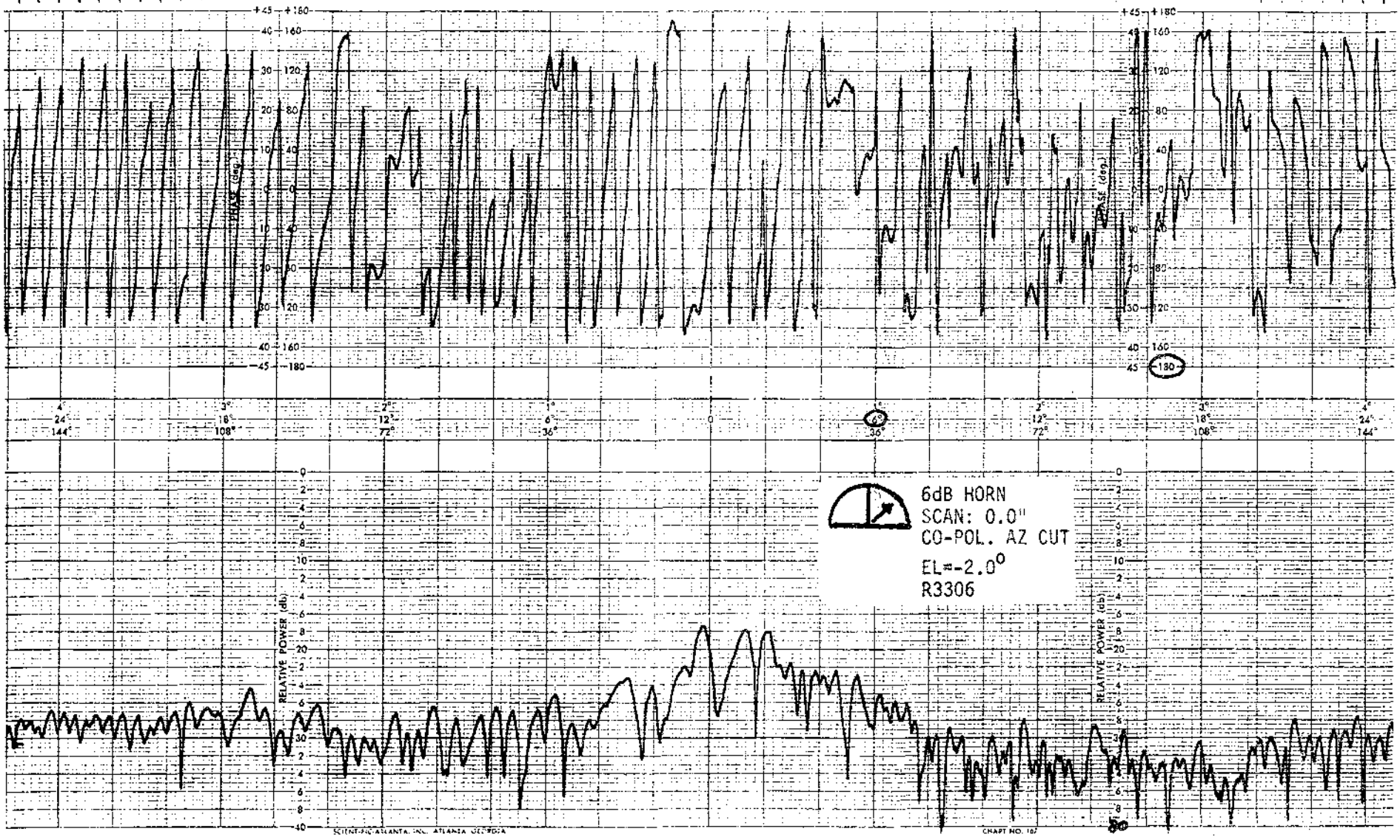

6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=+3.0°
R3301
PHASE (deg.)
RELATIVE POWER (dB)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA
CHART NO. 167

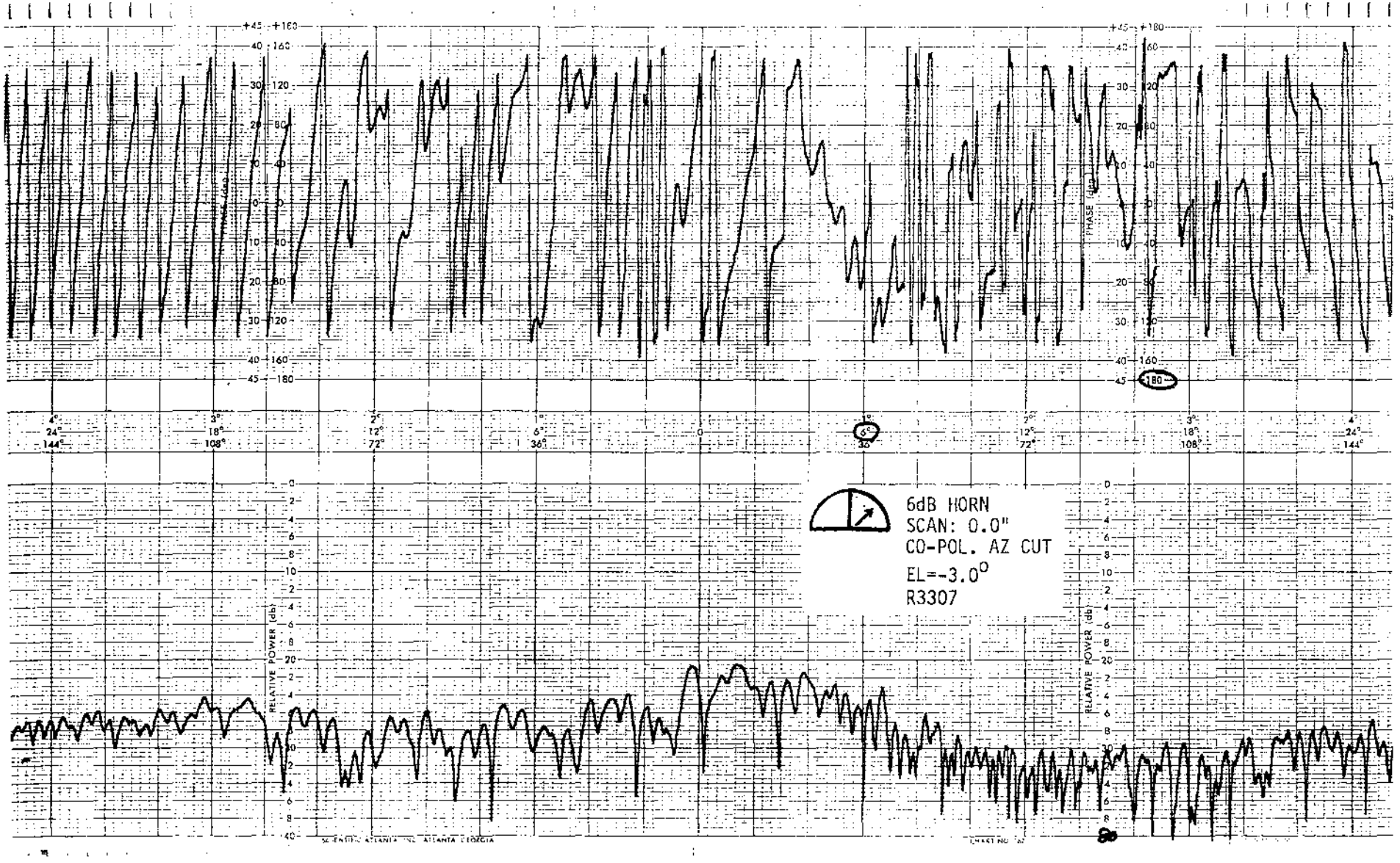

6db HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=+2.0°
R3302
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA
CHART NO. 16

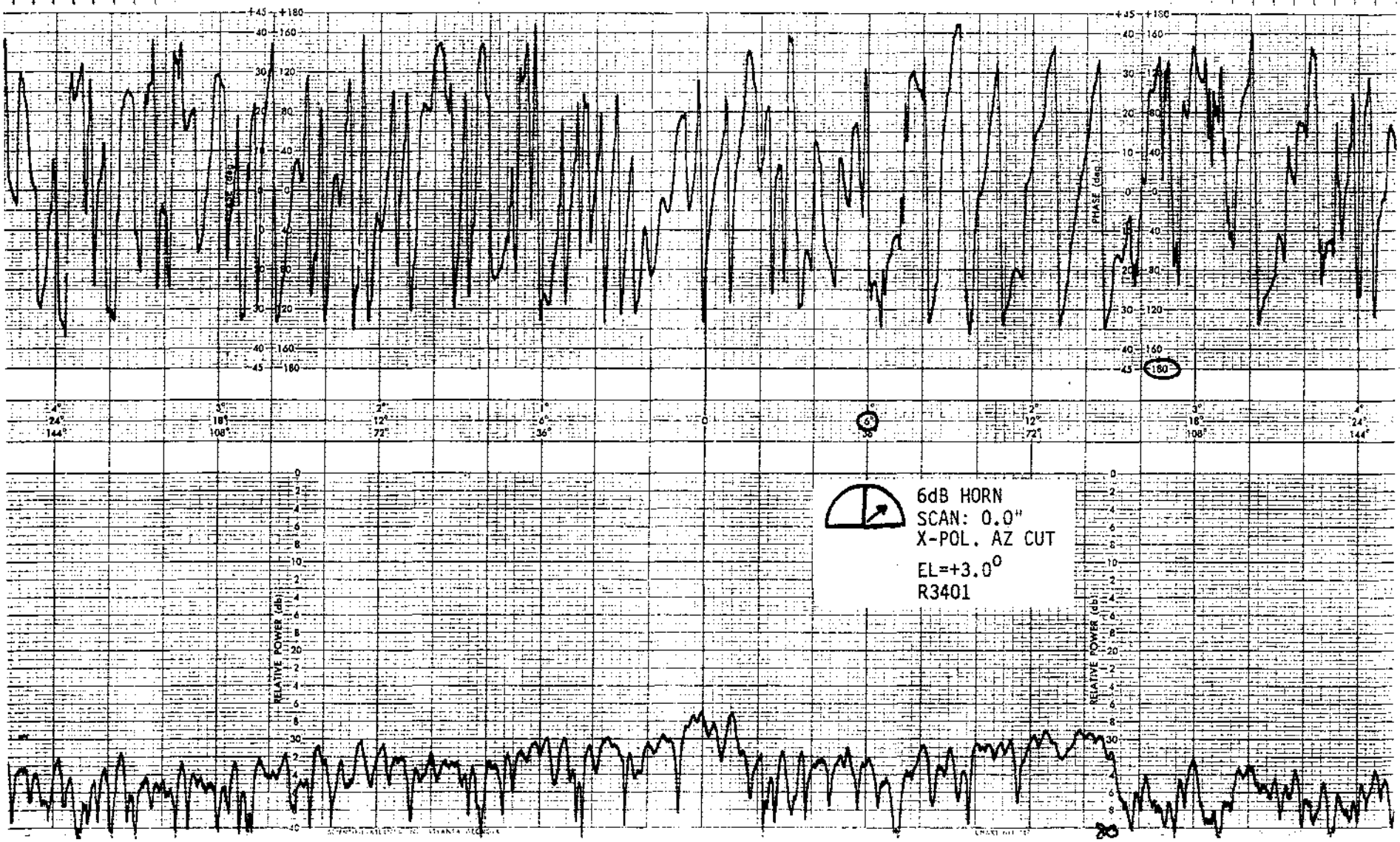

6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=+1.0°
R3303
RELATIVE POWER (db)

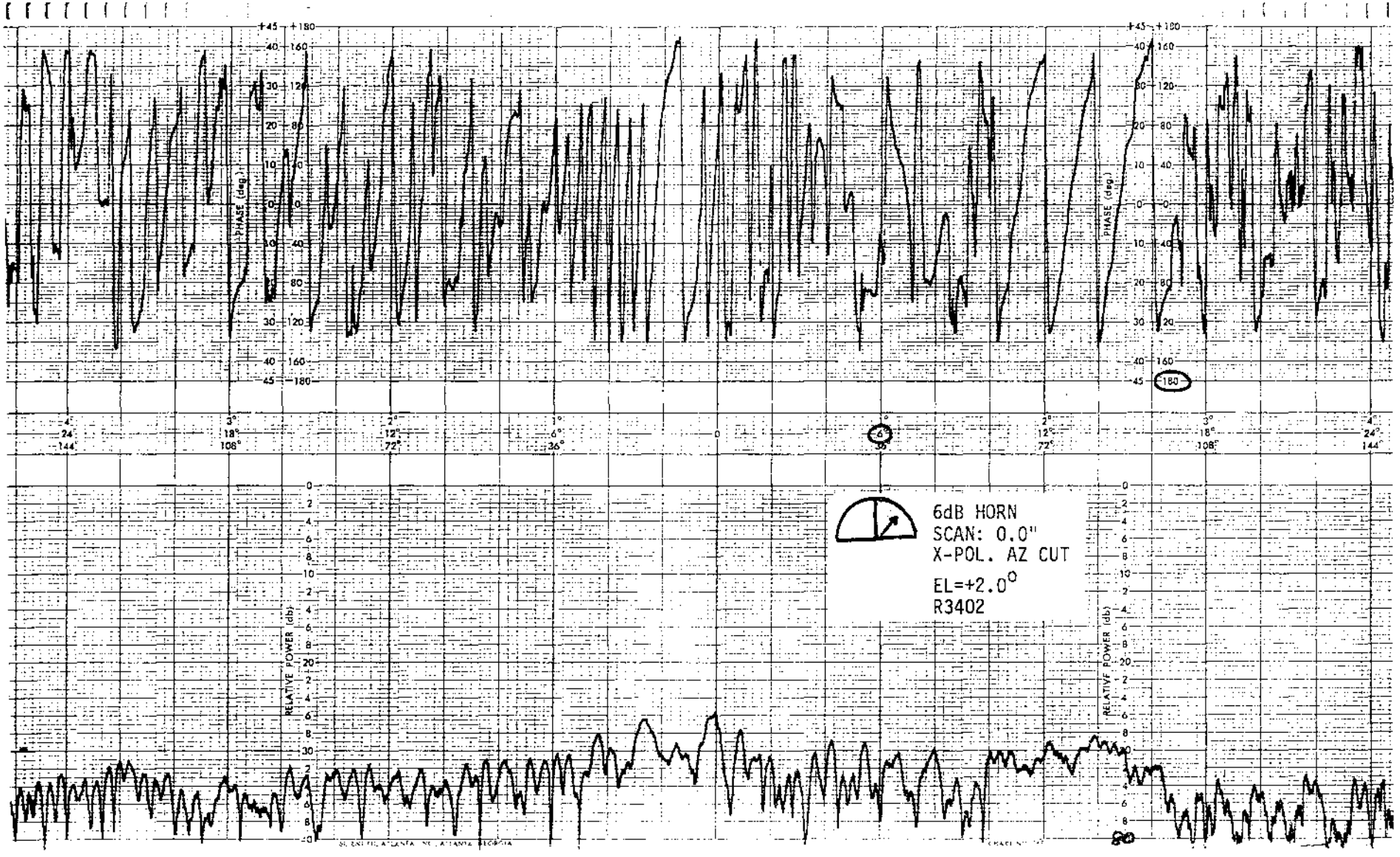

6dB HORN
SCAN: 0.0°
CO-POL. AZ CUT
EL=0.0°
R3304
PHASE (deg.)
RELATIVE POWER (db)

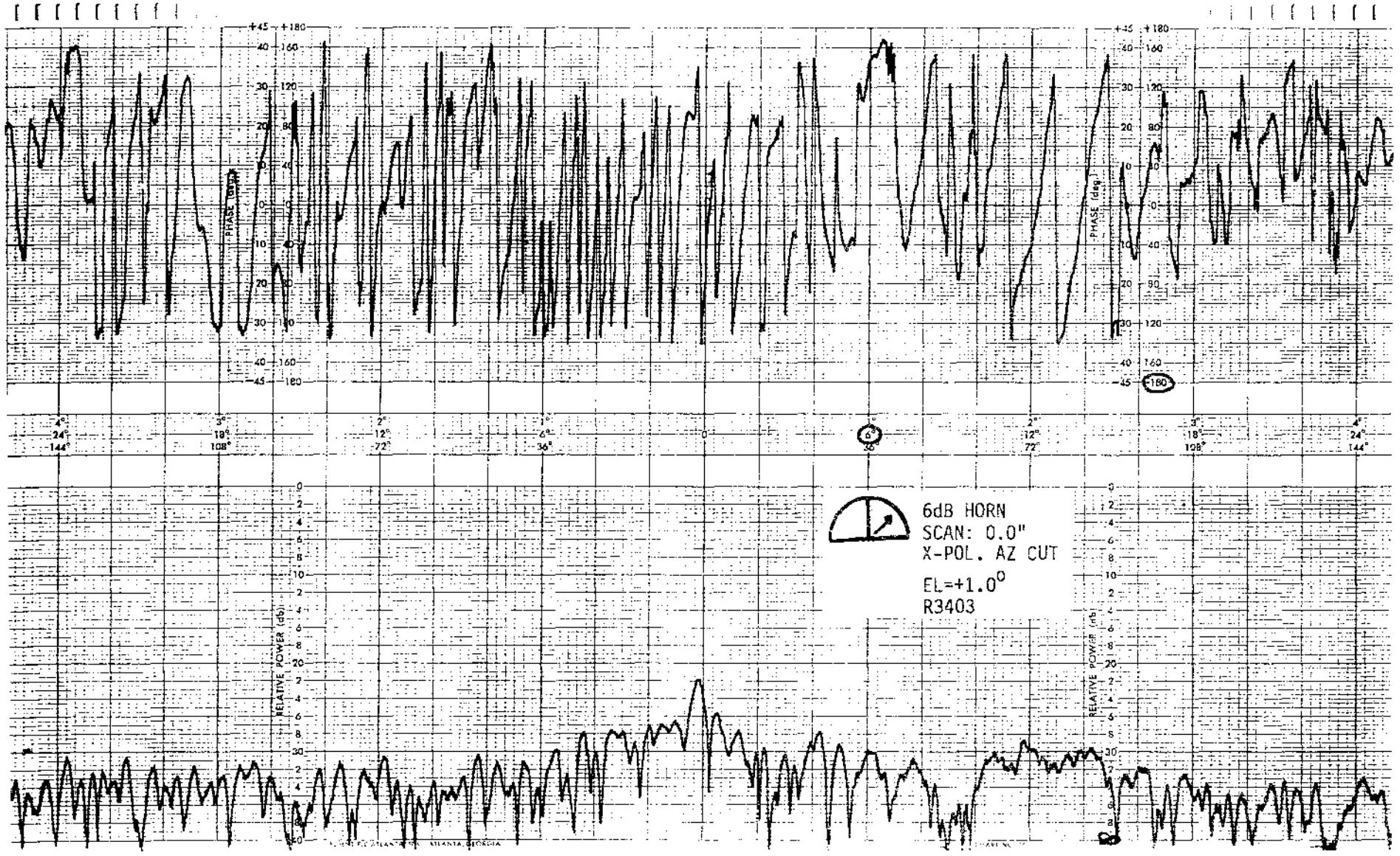

6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=-1.0°
R3305
PHASE (deg.)
RELATIVE POWER (db)

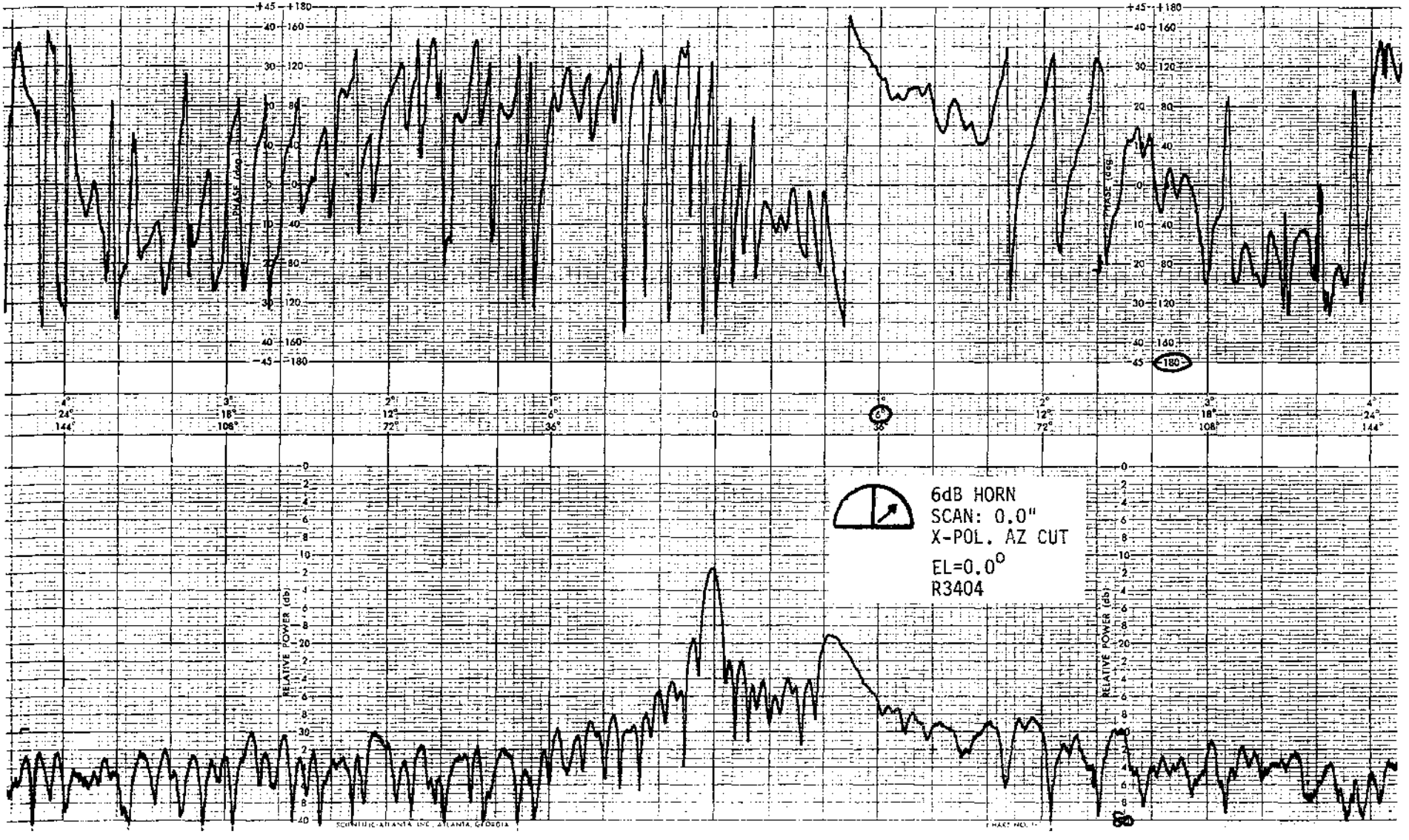

6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=-2.0°
R3306
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC. ATLANTA GEORGIA
CHART NO. 107

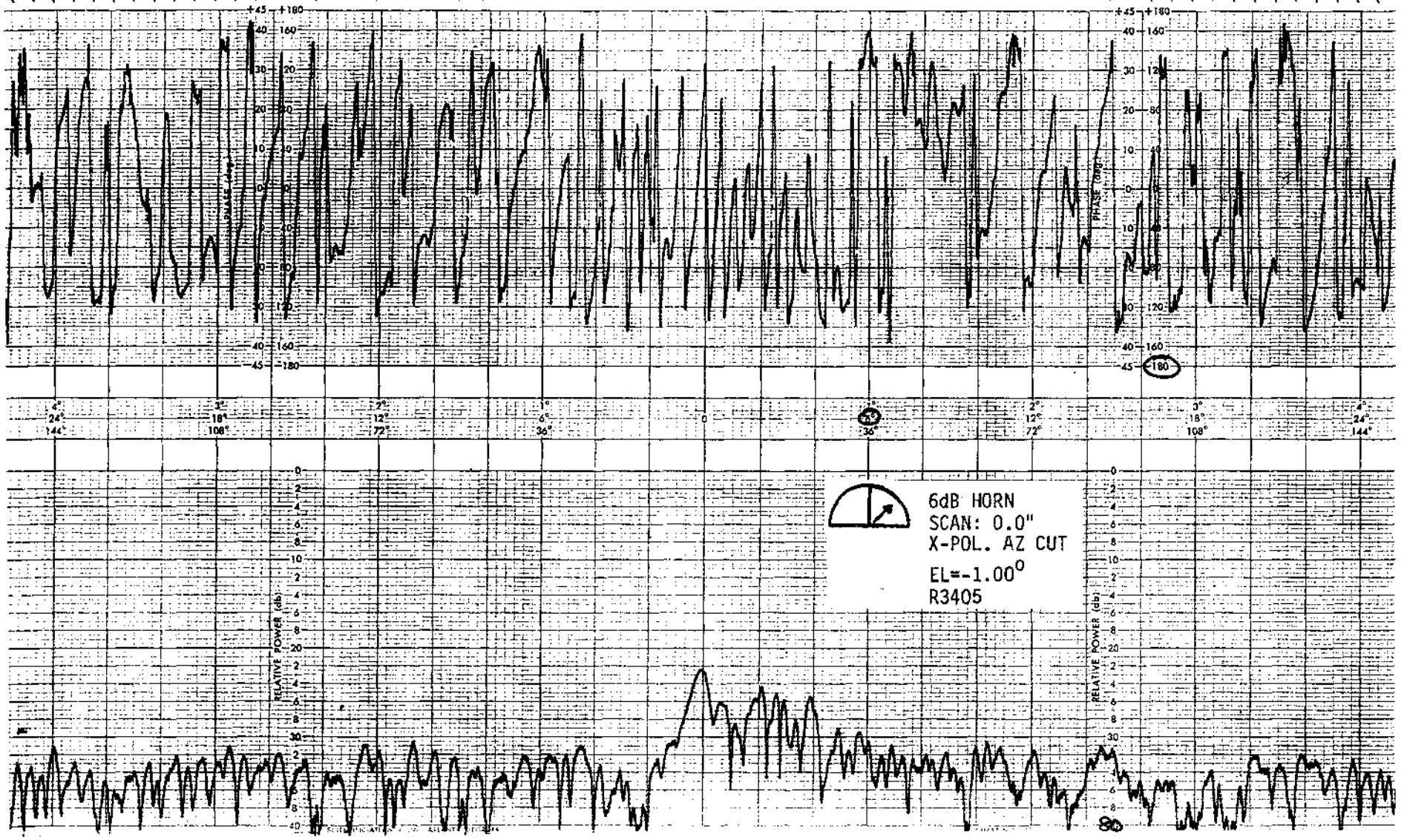

6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=-3.0°
R3307
PHASE (deg)
RELATIVE POWER (db)


6dB HORN
SCAN: 0.0°
X-POL. AZ CUT
EL=+3.0°
R3401
PHASE (deg.)
RELATIVE POWER (db)

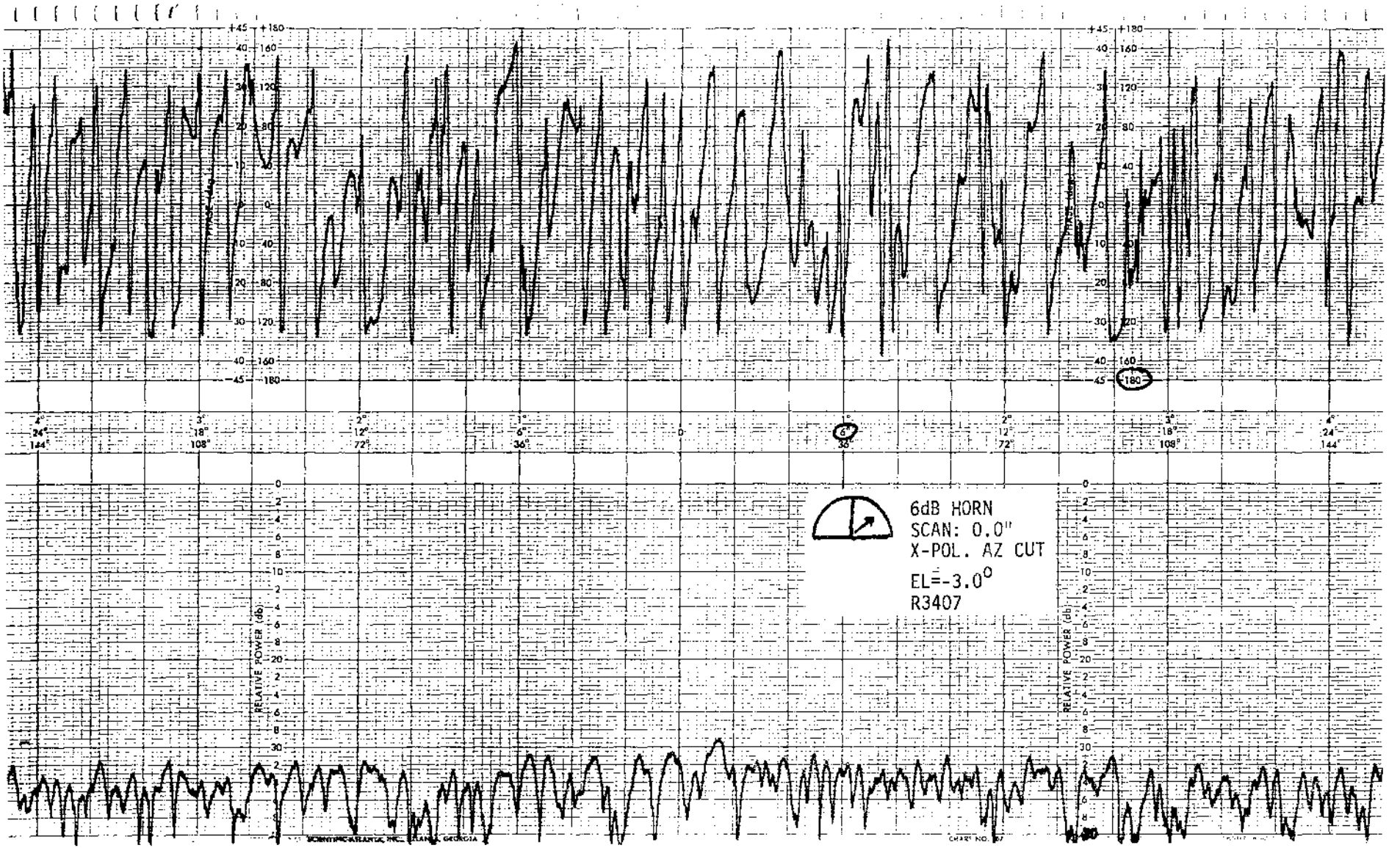

PHASE (deg.)
RELATIVE POWER (db)
6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=+2.0°
R3402

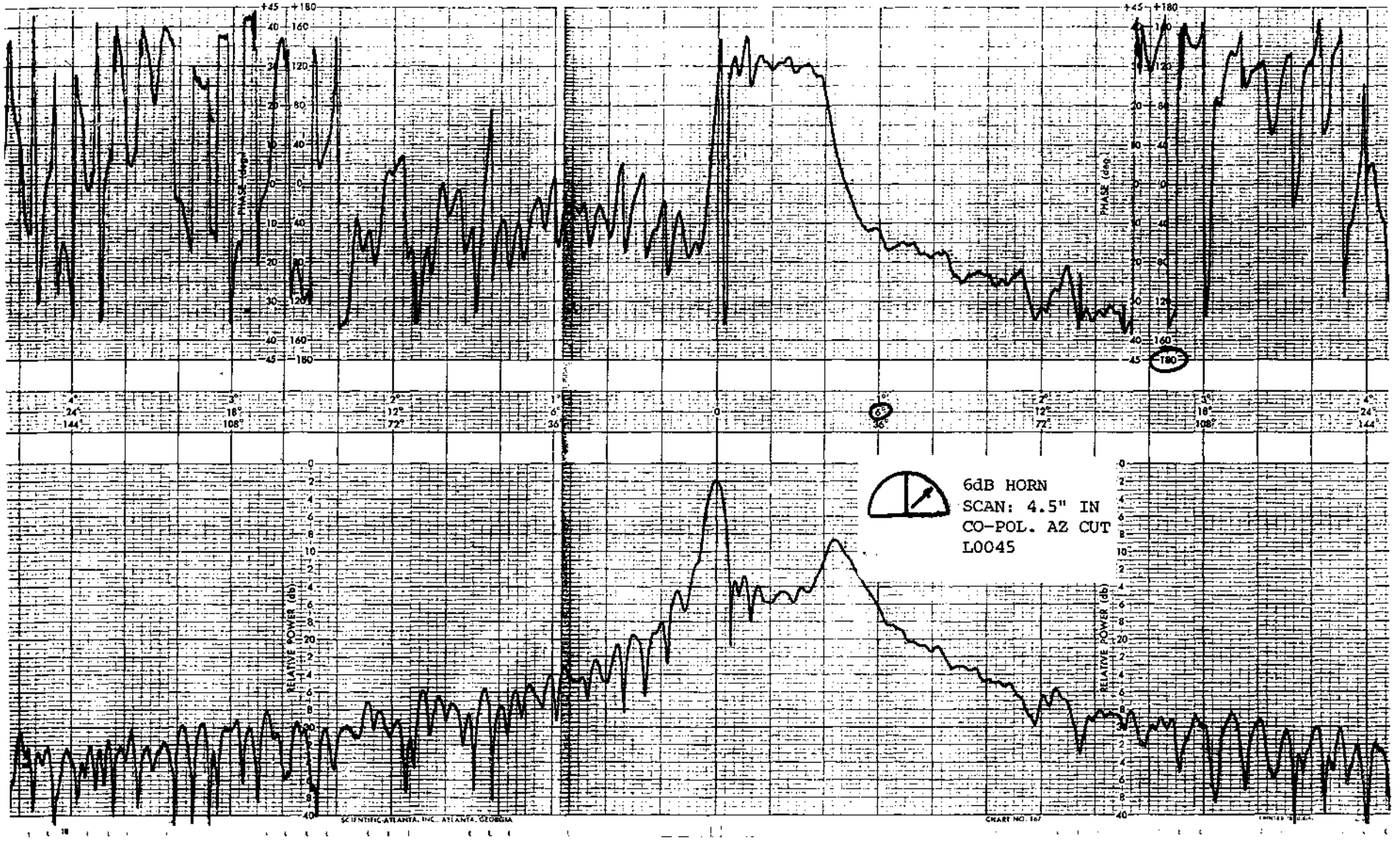

6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=+1.0°
R3403
PHASE (deg)
RELATIVE POWER (db)

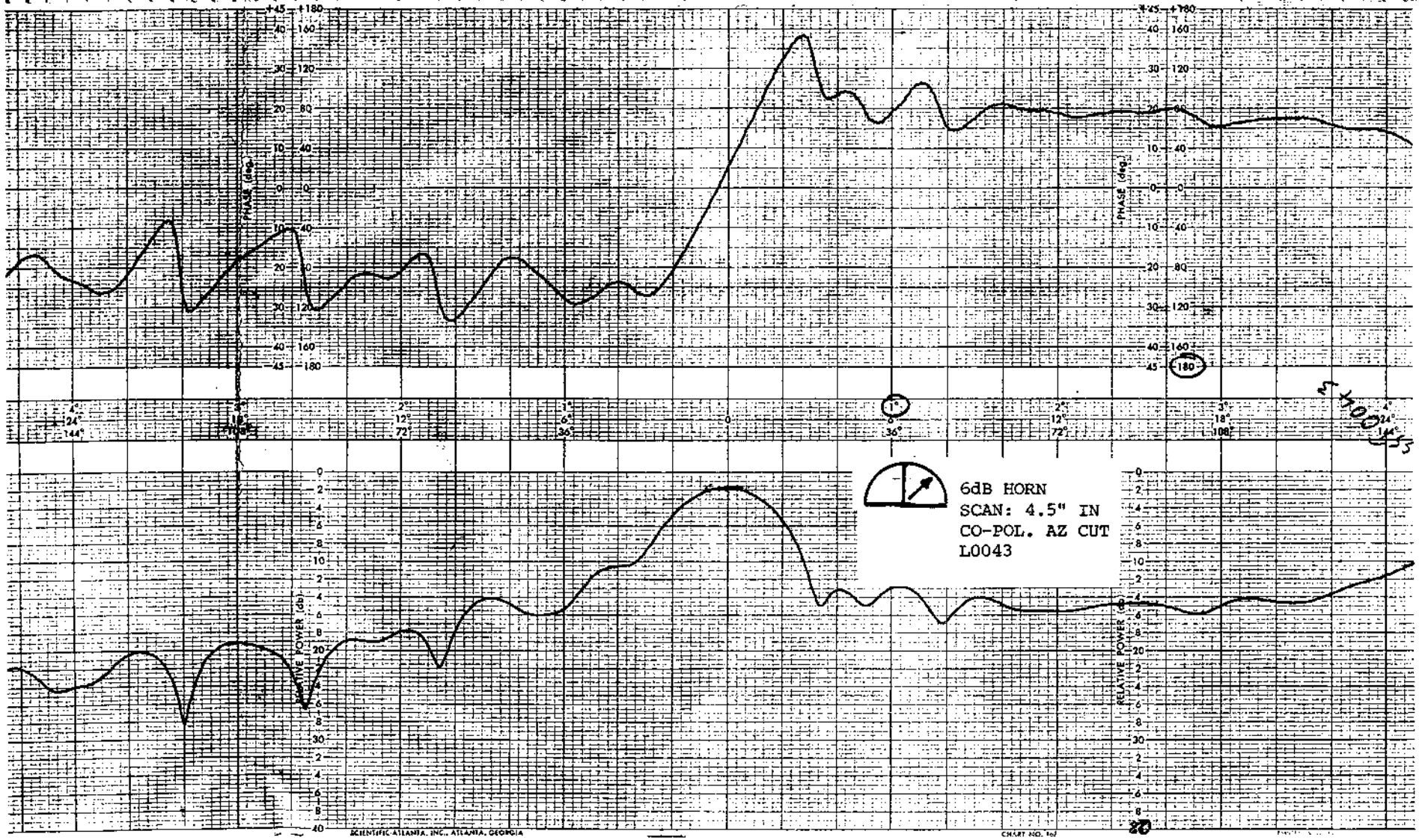

6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=0.0°
R3404
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA INC., ATLANTA, GEORGIA

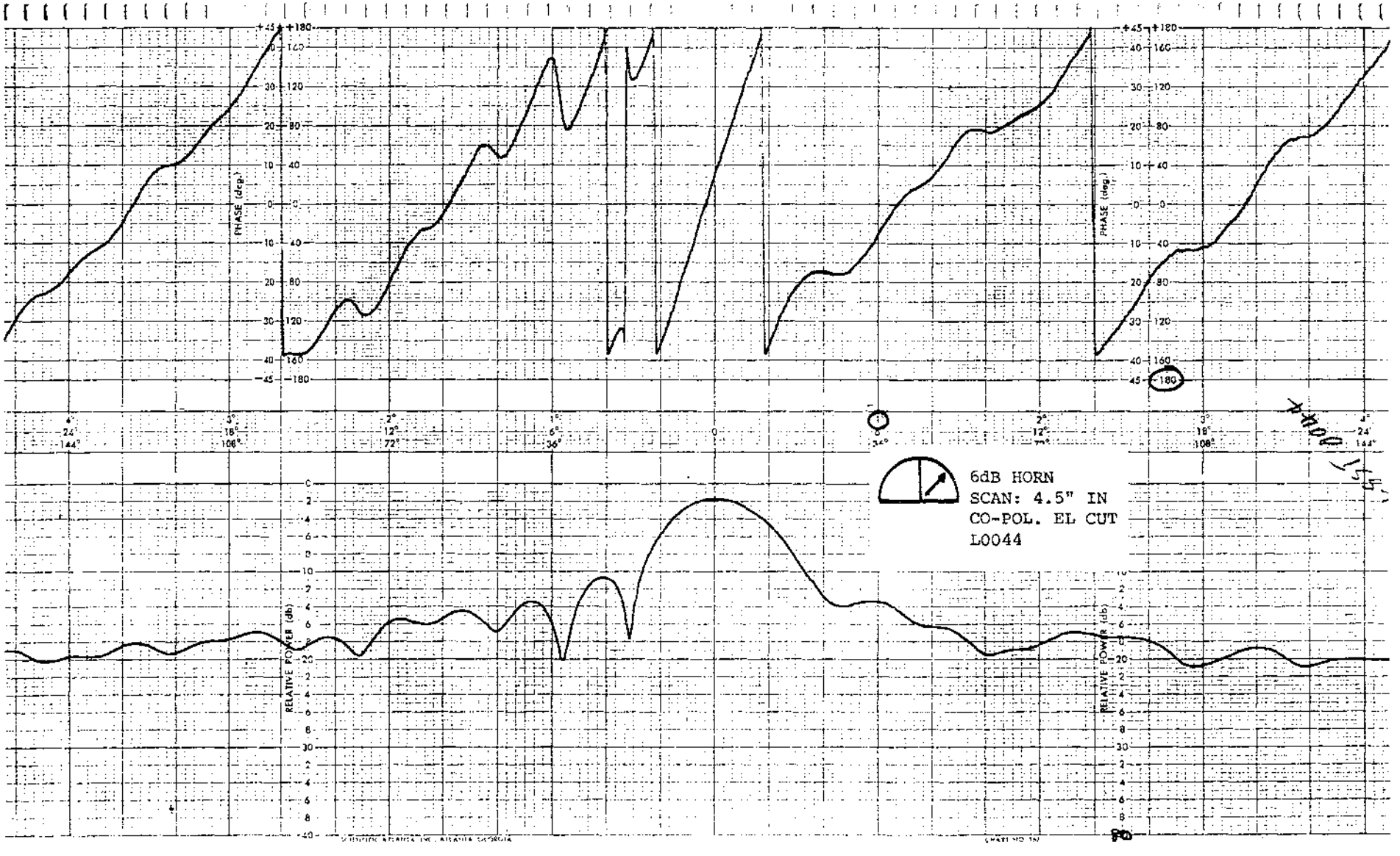

6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=-1.00°
R3405
RELATIVE POWER (db)
PHASE (deg)

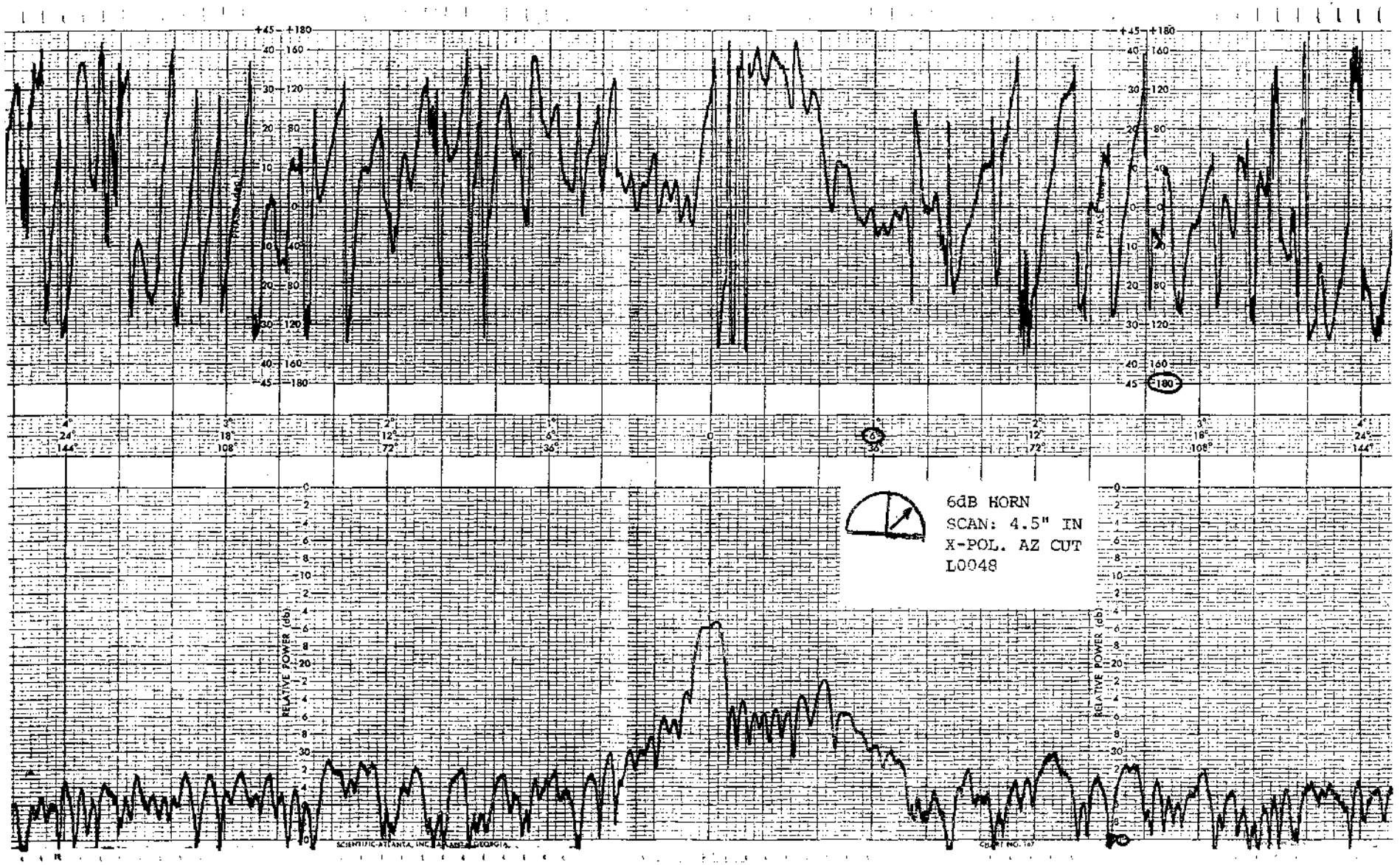
6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=-2.0°
R3406
PHASE (deg.)
RELATIVE POWER (db)

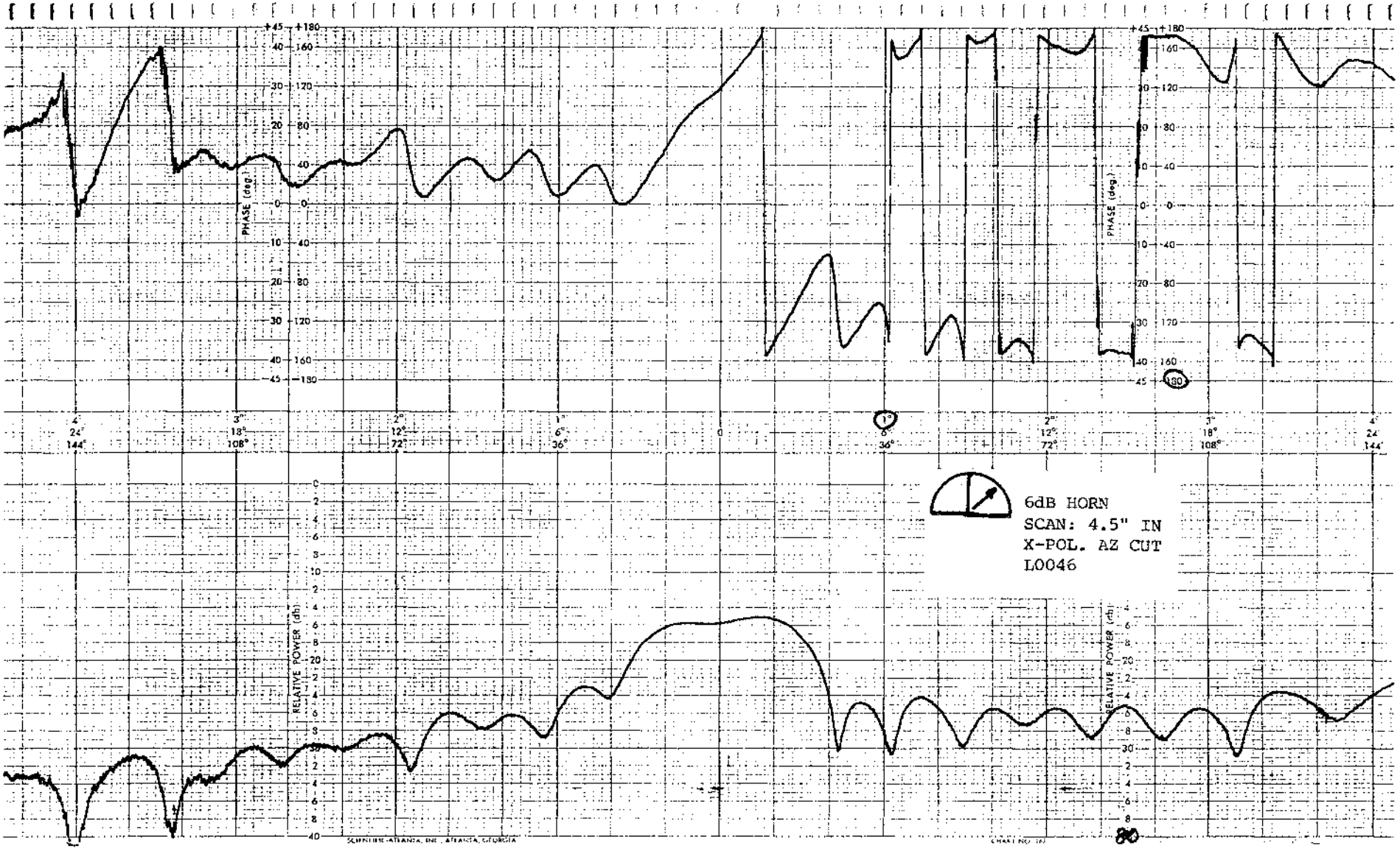

6dB HORN
SCAN: 0.0°
X-POL. AZ CUT
EL=-3.0°
R3407
RELATIVE POWER (db)

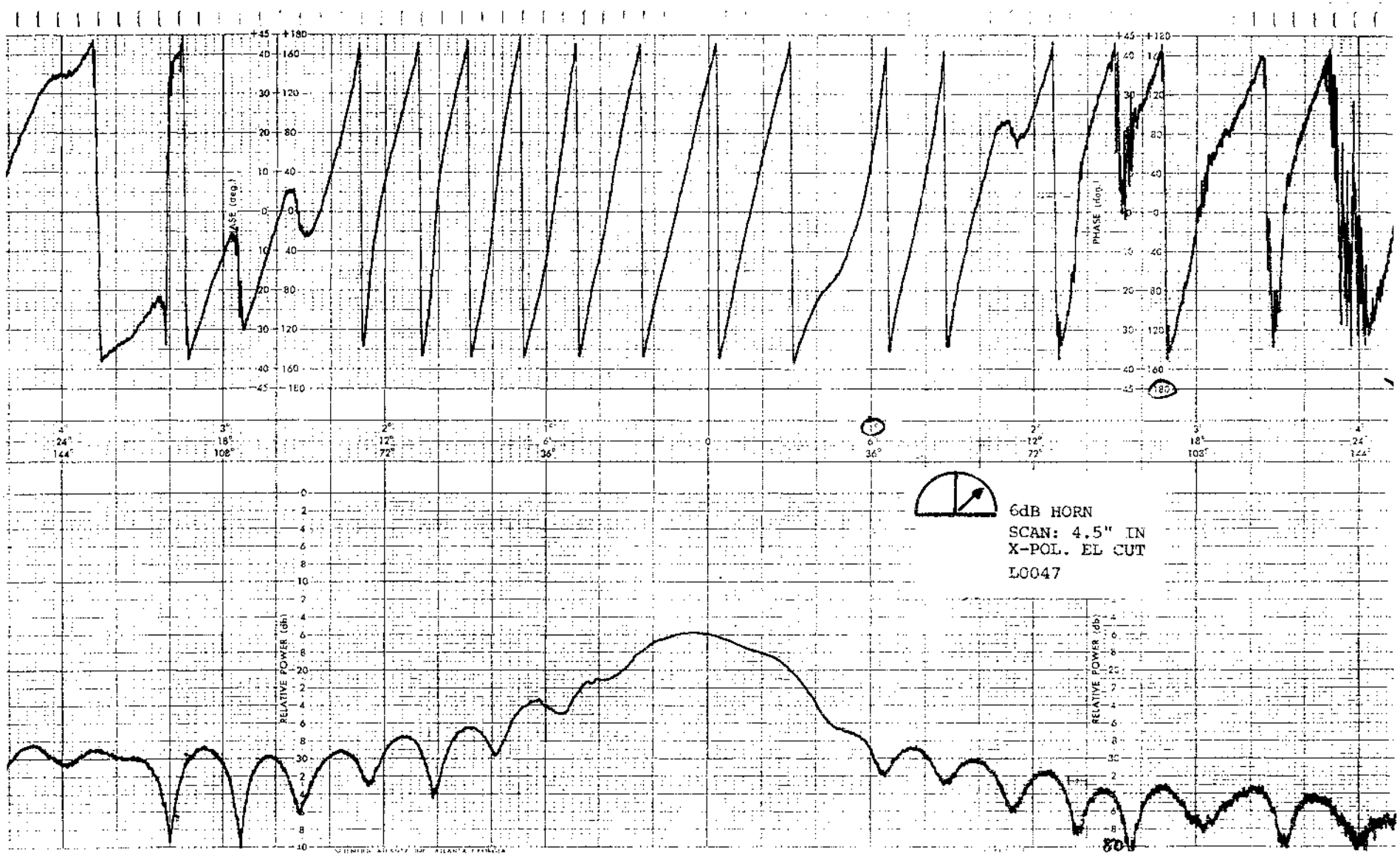

6dB HORN
SCAN: 4.5" IN
CO-POL. AZ CUT
L0045
PHASE (deg)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA
CHART NO. 167

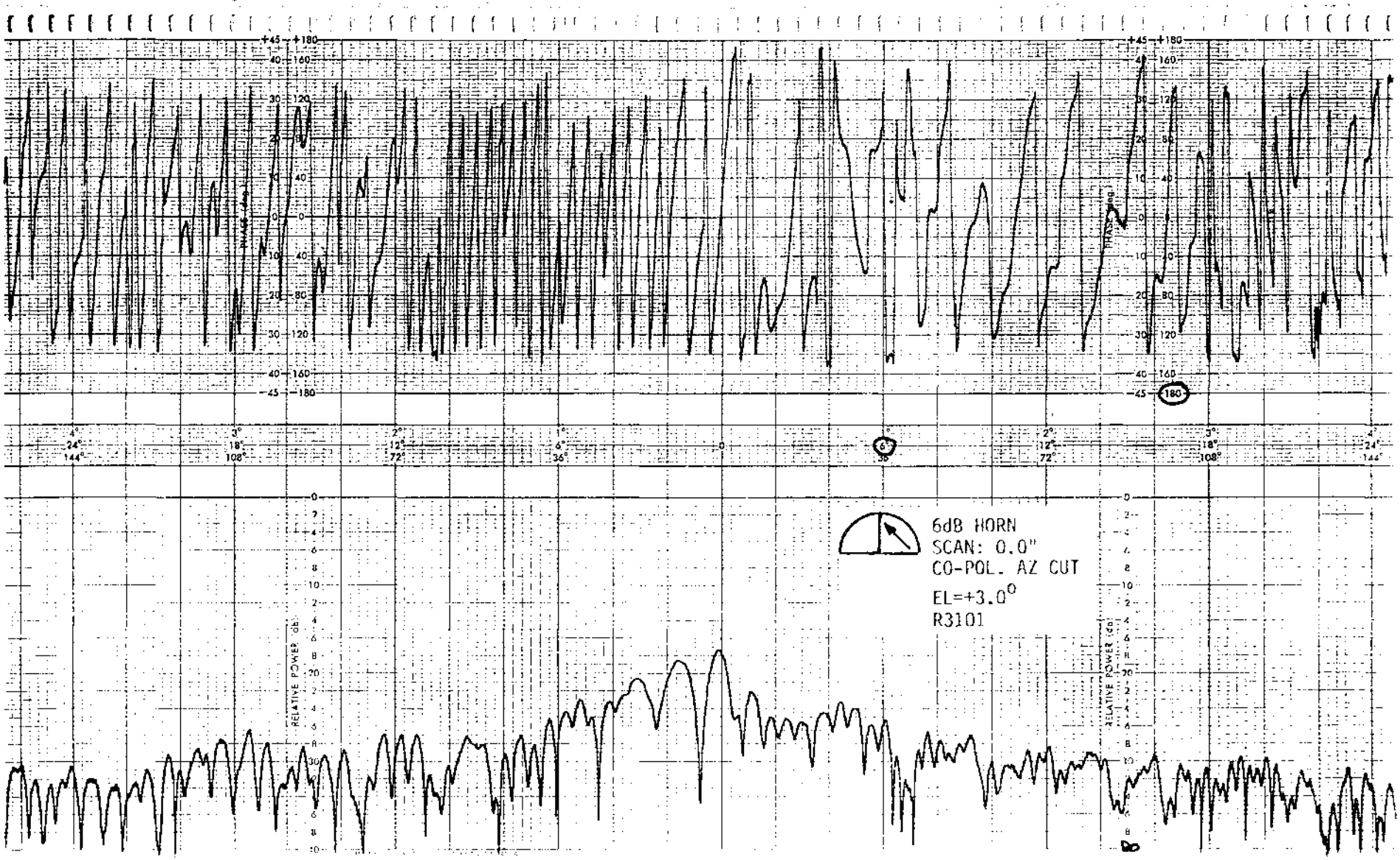

6dB HORN
SCAN: 4.5" IN
CO-POL. AZ CUT
L0043
PHASE (deg)
RELATIVE POWER (db)
SCIENTIFIC ATLANTA, INC., ATLANTA, GEORGIA

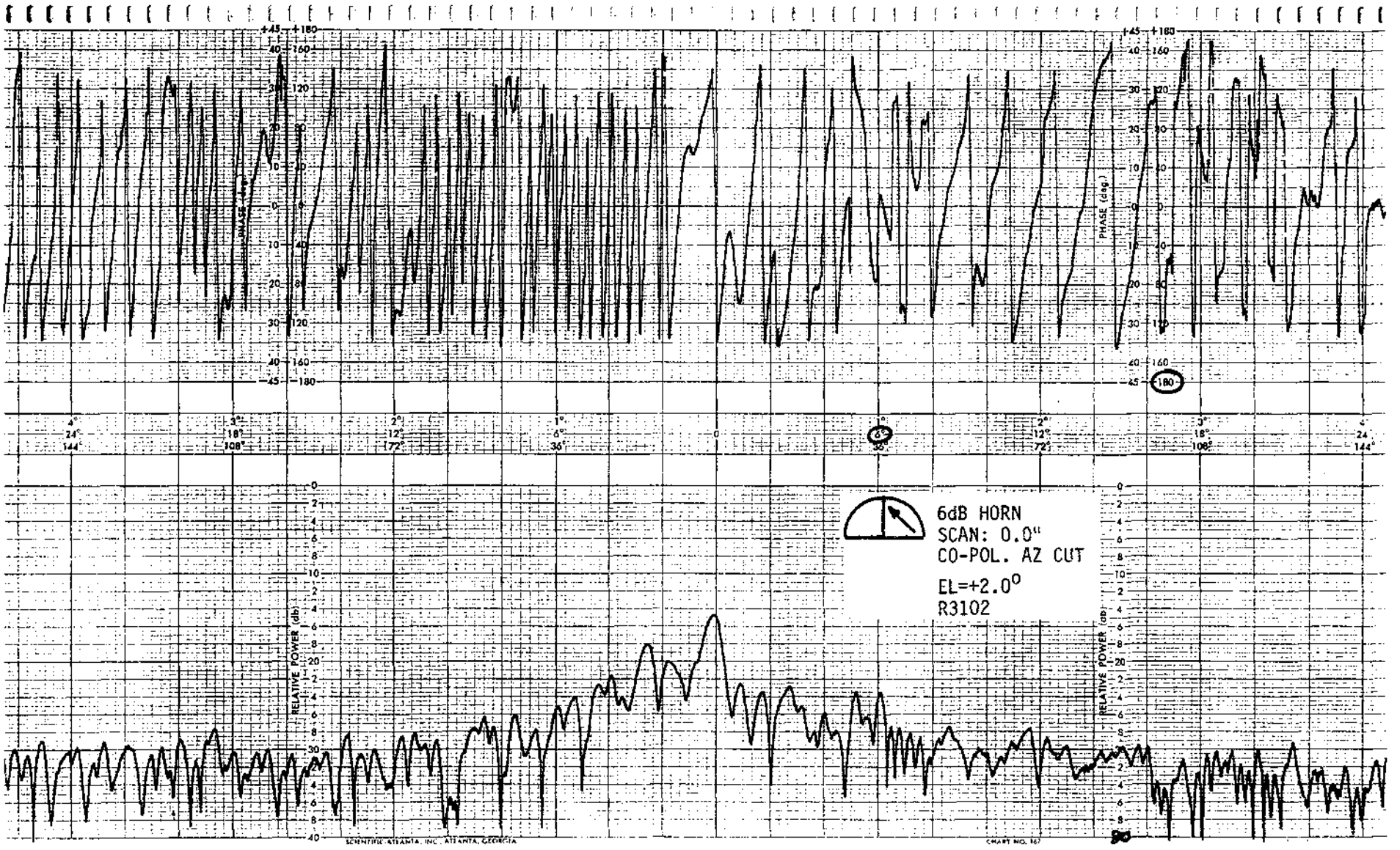

PHASE (deg.)
RELATIVE POWER (db)
6dB HORN
SCAN: 4.5" IN
CO-POL. EL CUT
L0044

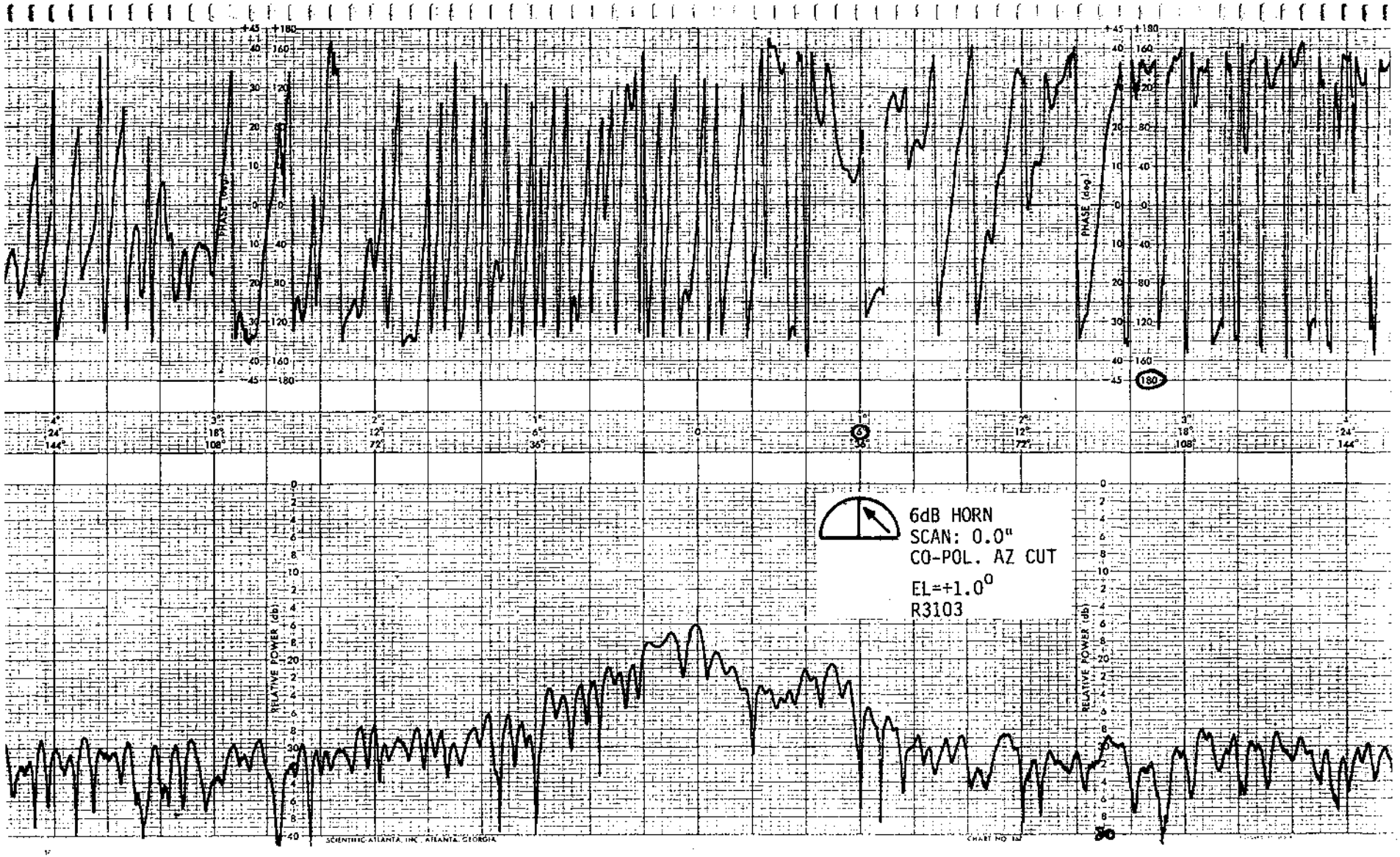

6dB HORN
SCAN: 4.5" IN
X-POL. AZ CUT
L0048
RELATIVE POWER (db)
PHASE (degrees)

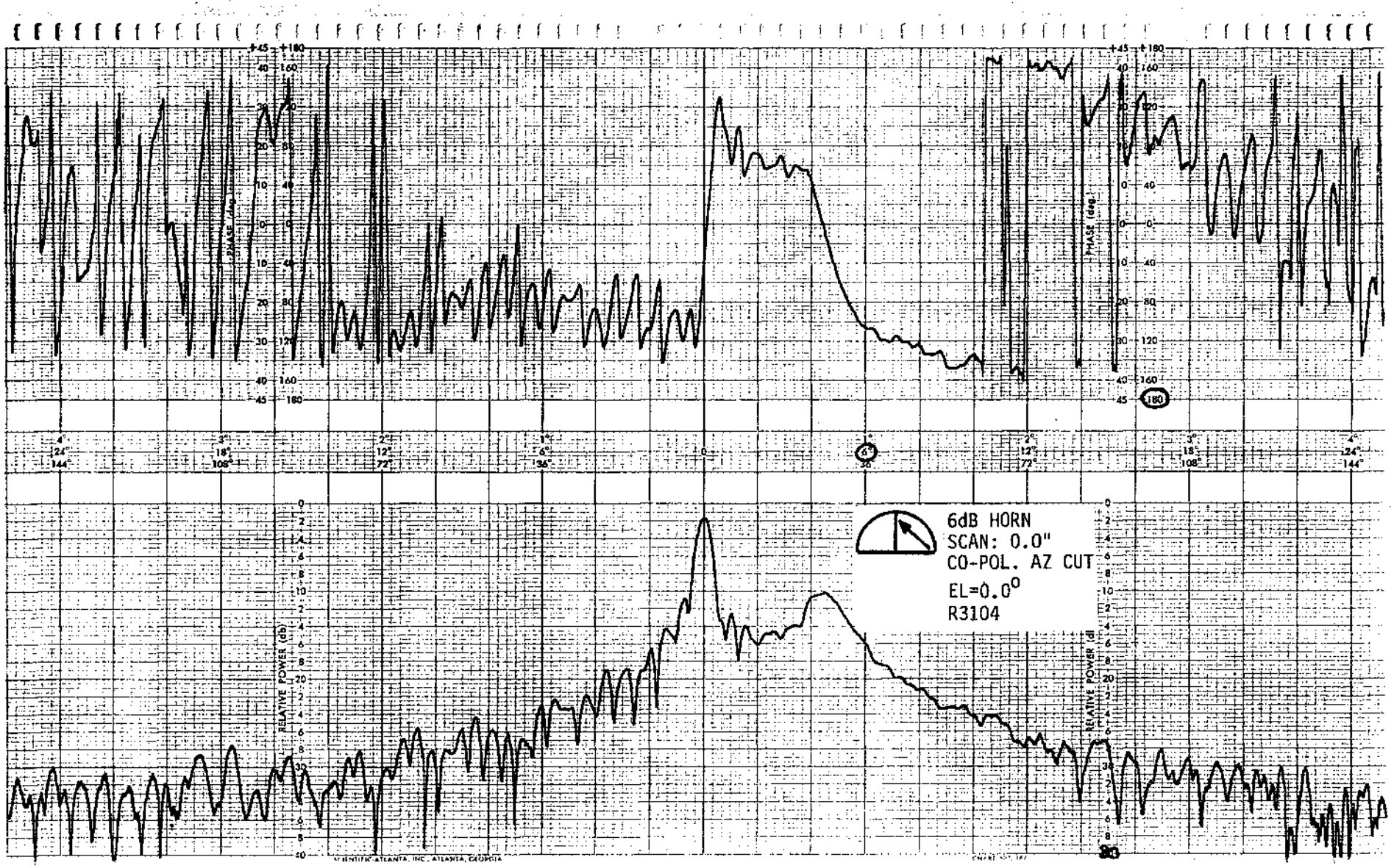

PHASE (deg.)
RELATIVE POWER (db)
6dB HORN
SCAN: 4.5" IN
X-POL. AZ CUT
L0046

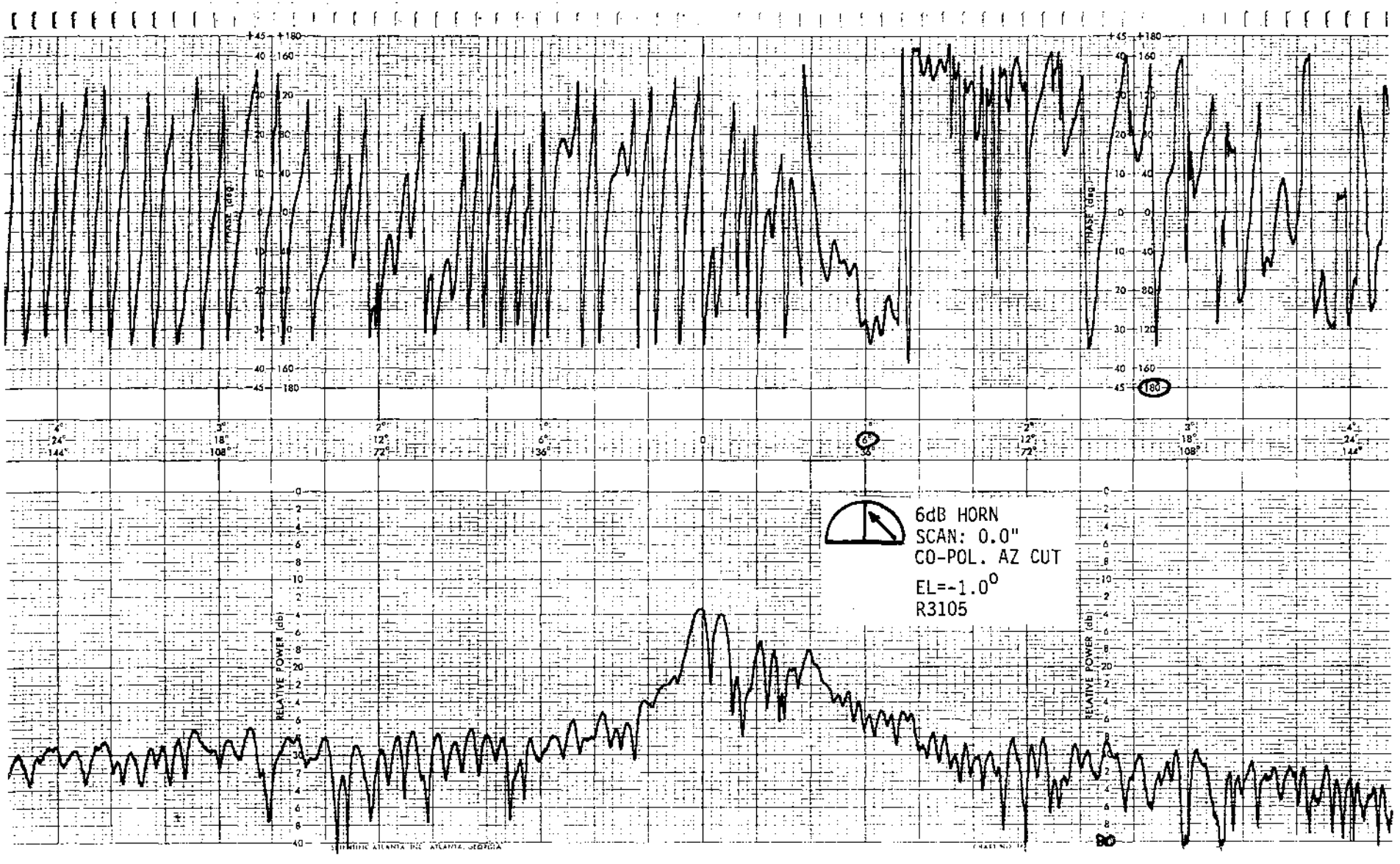

PHASE (deg.)
PHASE (deg.)
RELATIVE POWER (db)
RELATIVE POWER (db)
6dB HORN
SCAN: 4.5" IN
X-POL. EL CUT
L0047

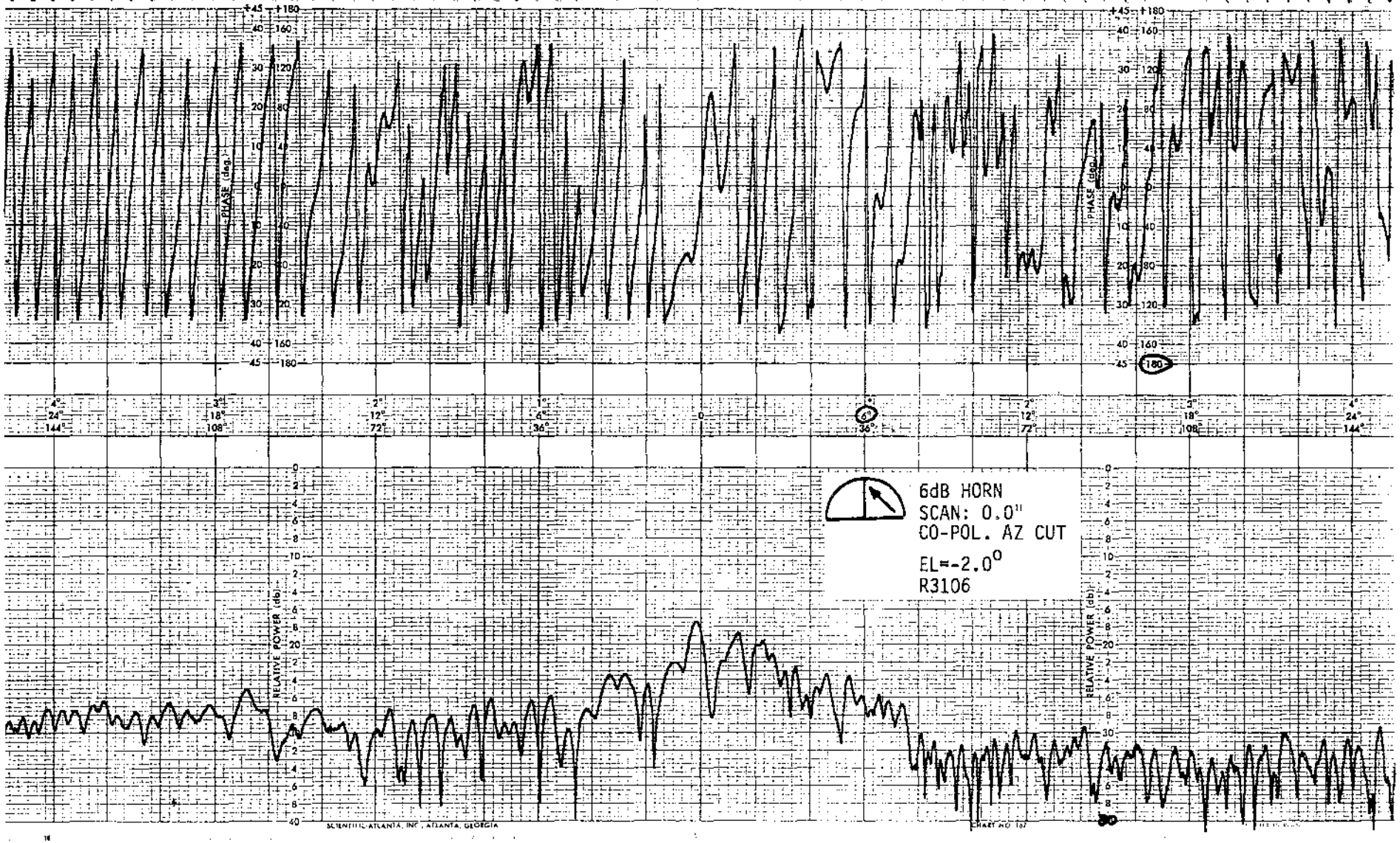

6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=+3.0°
R3101

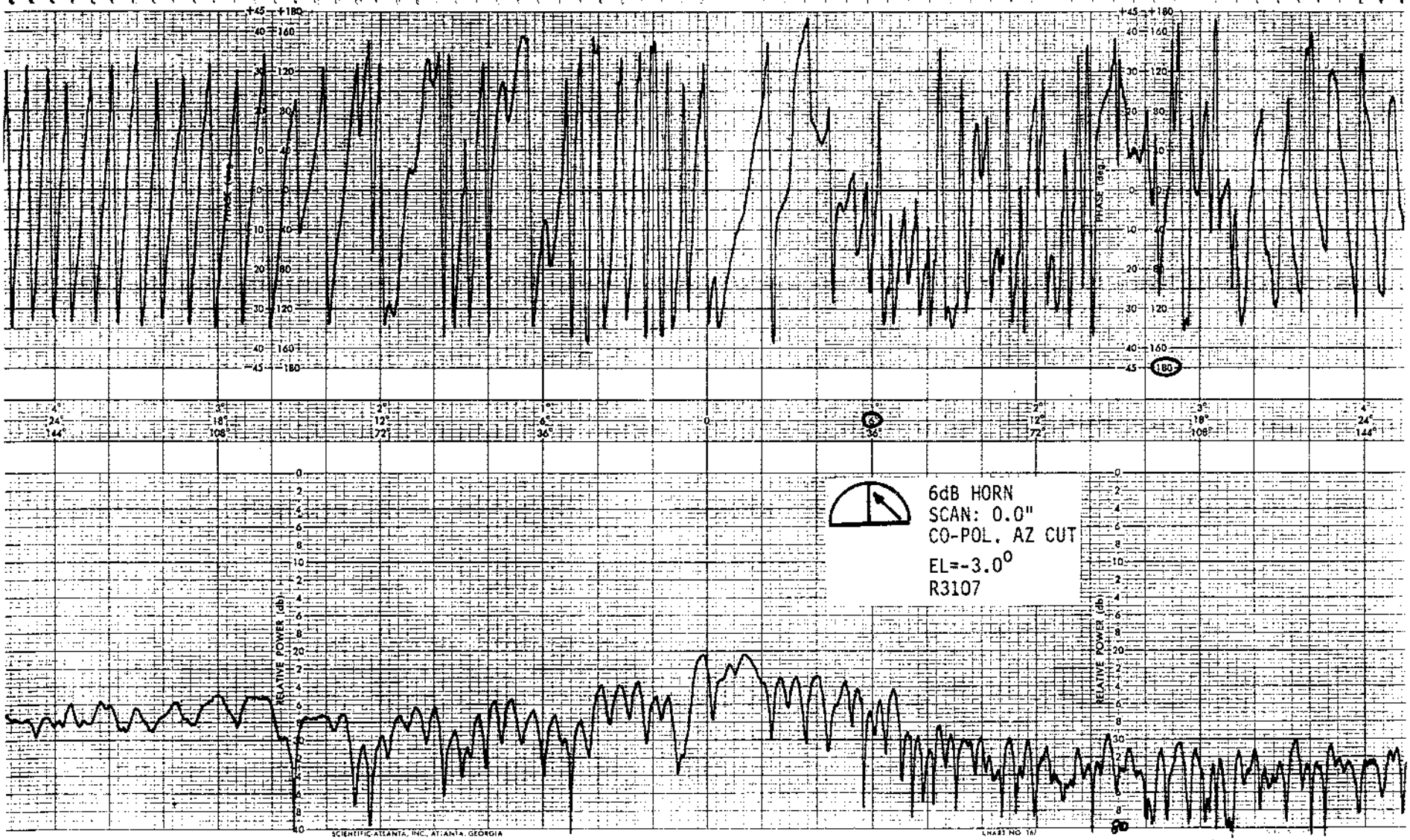

6dB HORN
SCAN: 0.0°
CO-POL. AZ CUT
EL=+2.0°
R3102
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

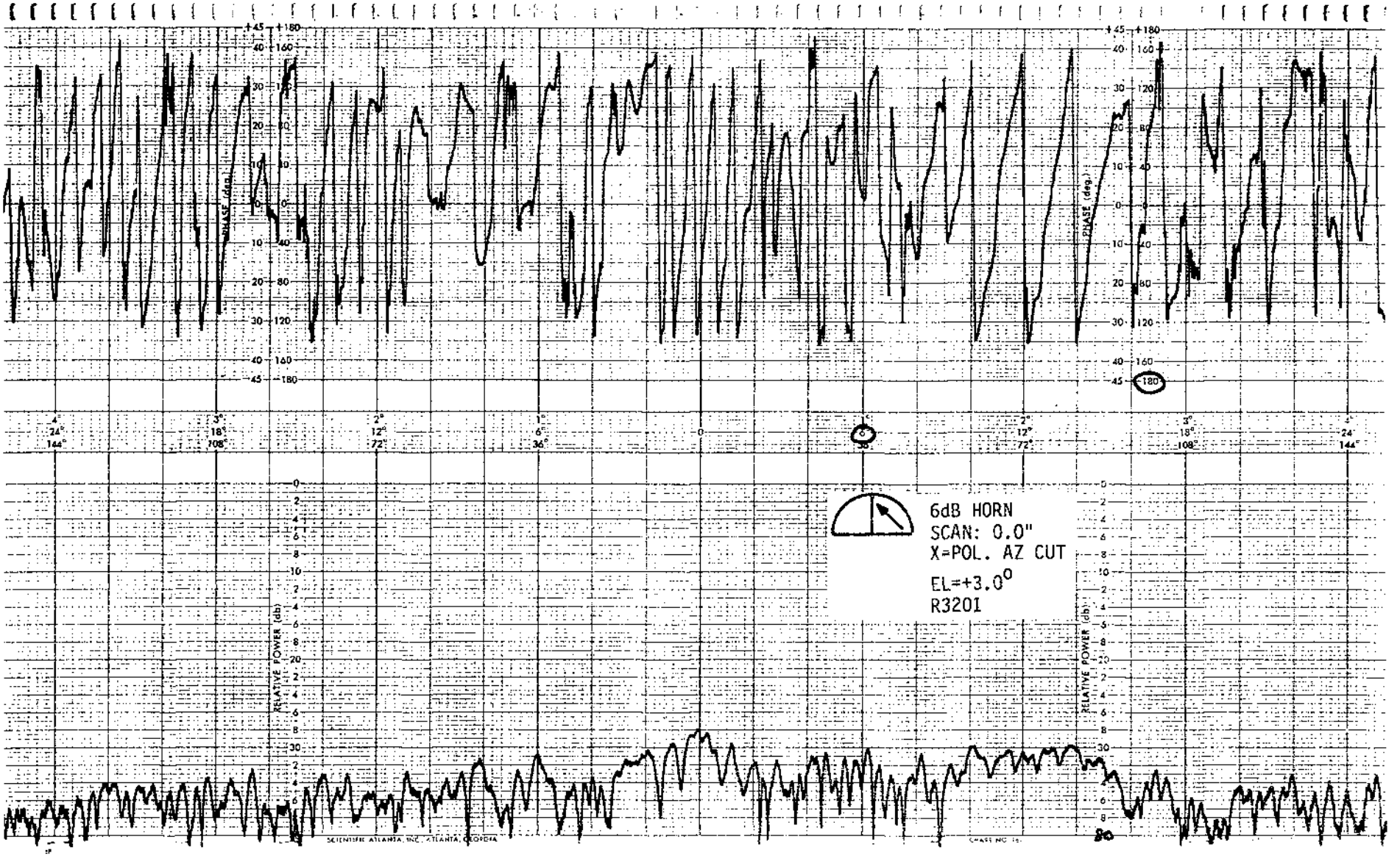

6dB HORN
SCAN: 0.0°
CO-POL. AZ CUT
EL=+1.0°
R3103
PHASE (deg)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA
CHART NO. 12

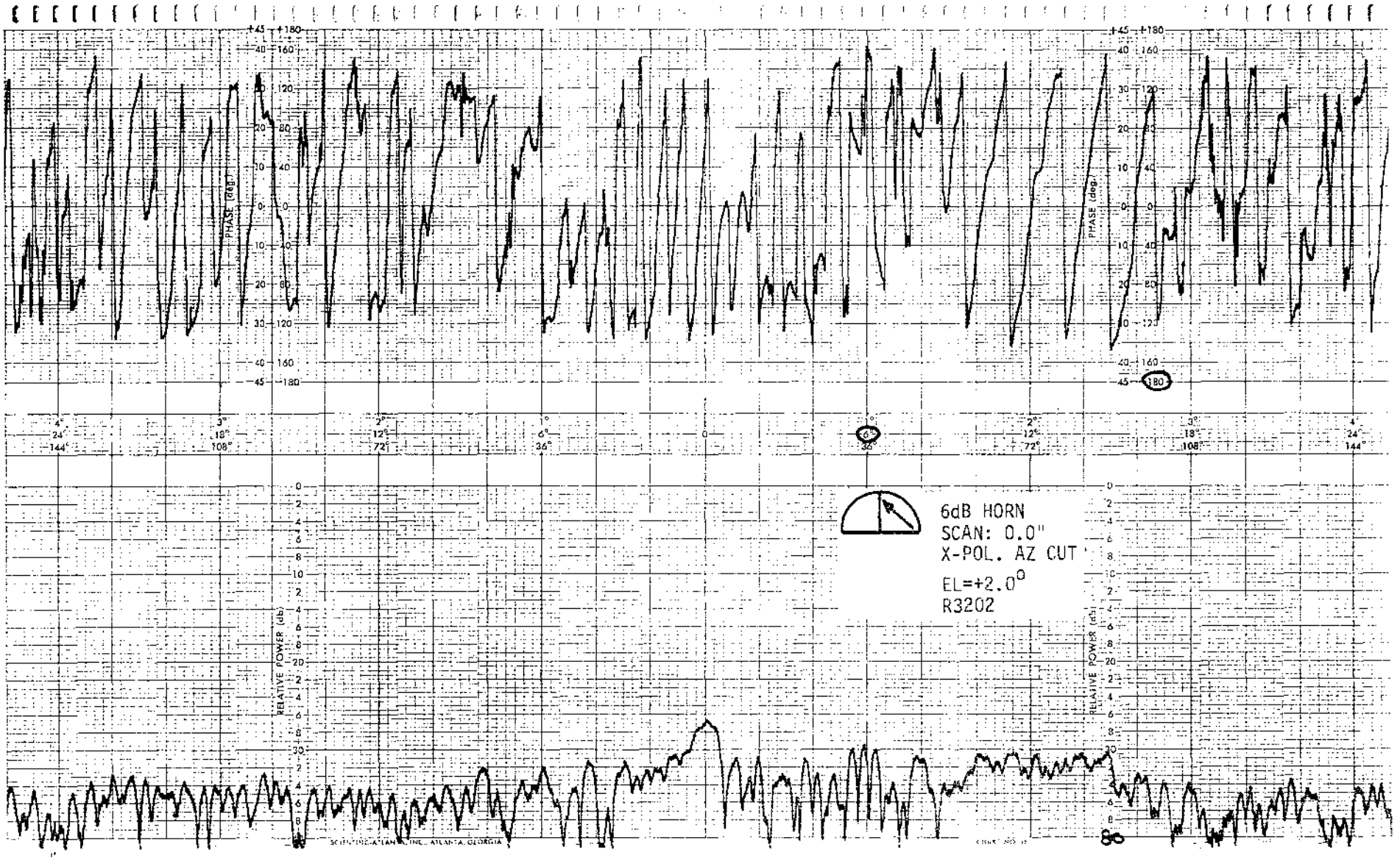

6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=0.0°
R3104
PHASE (deg)
RELATIVE POWER (db)

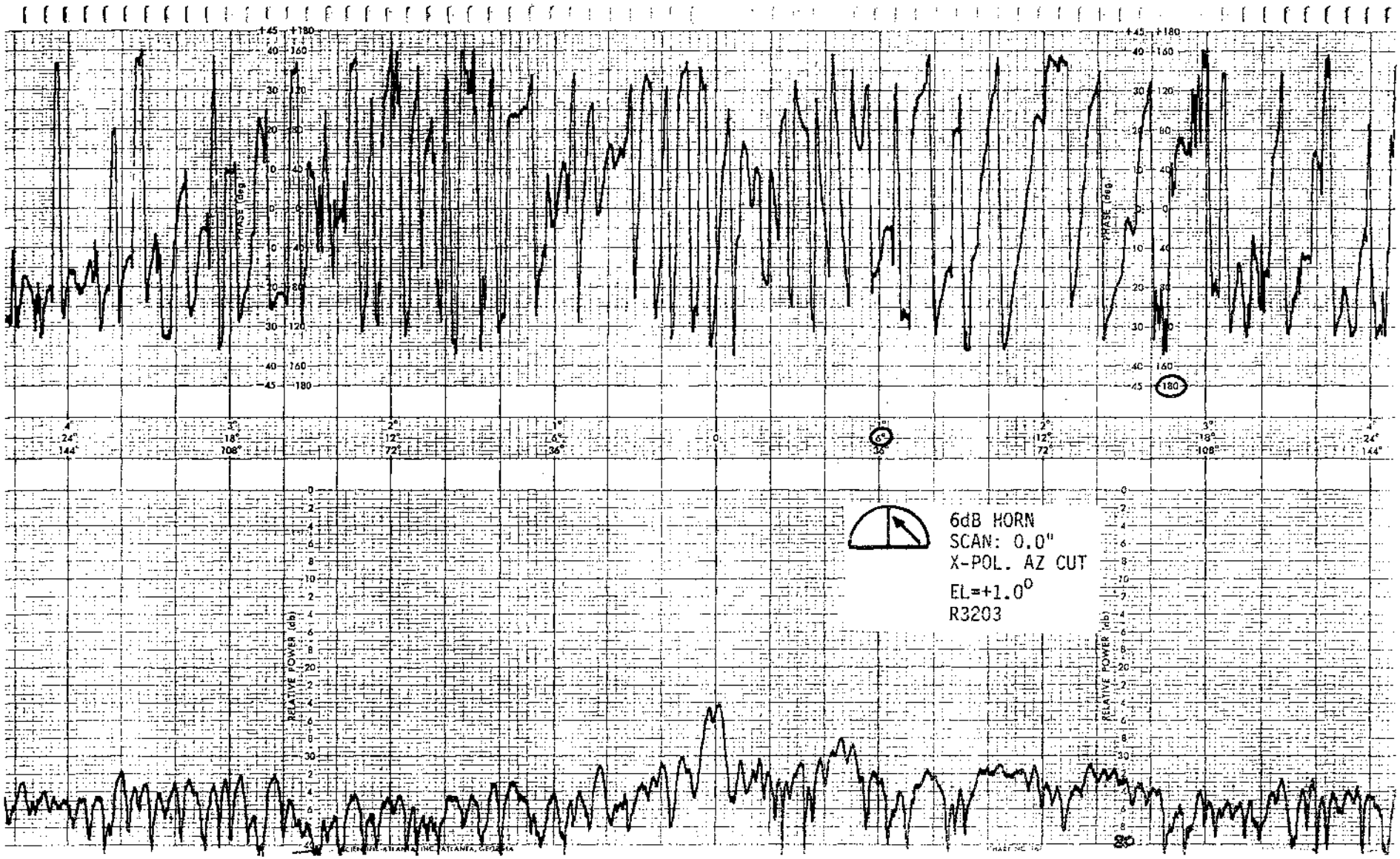

6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=-1.0°
R3105
PHASE (deg)
RELATIVE POWER (db)

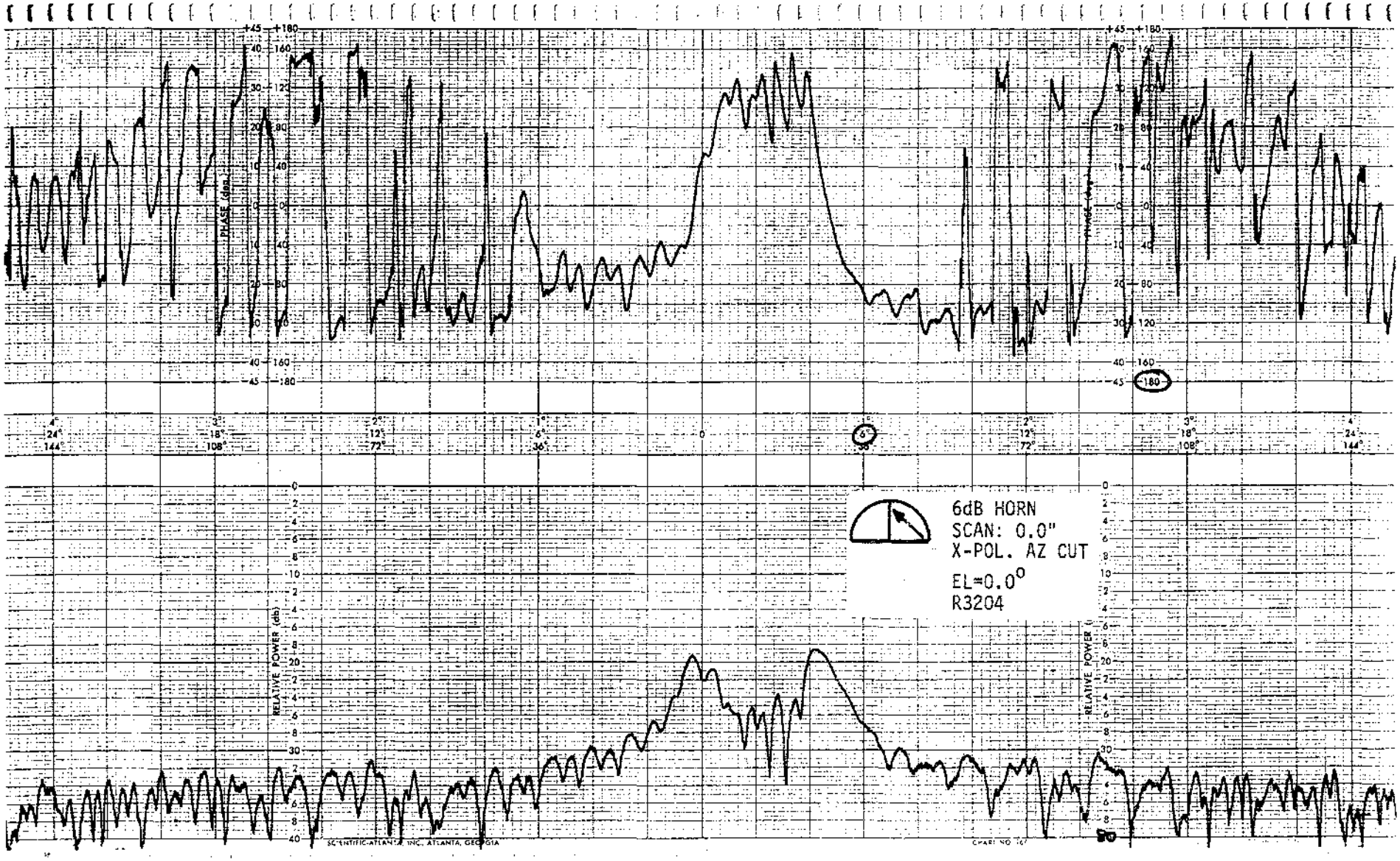

6dB HORN
SCAN: 0.0°
CO-POL. AZ CUT
EL=-2.0°
R3106
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

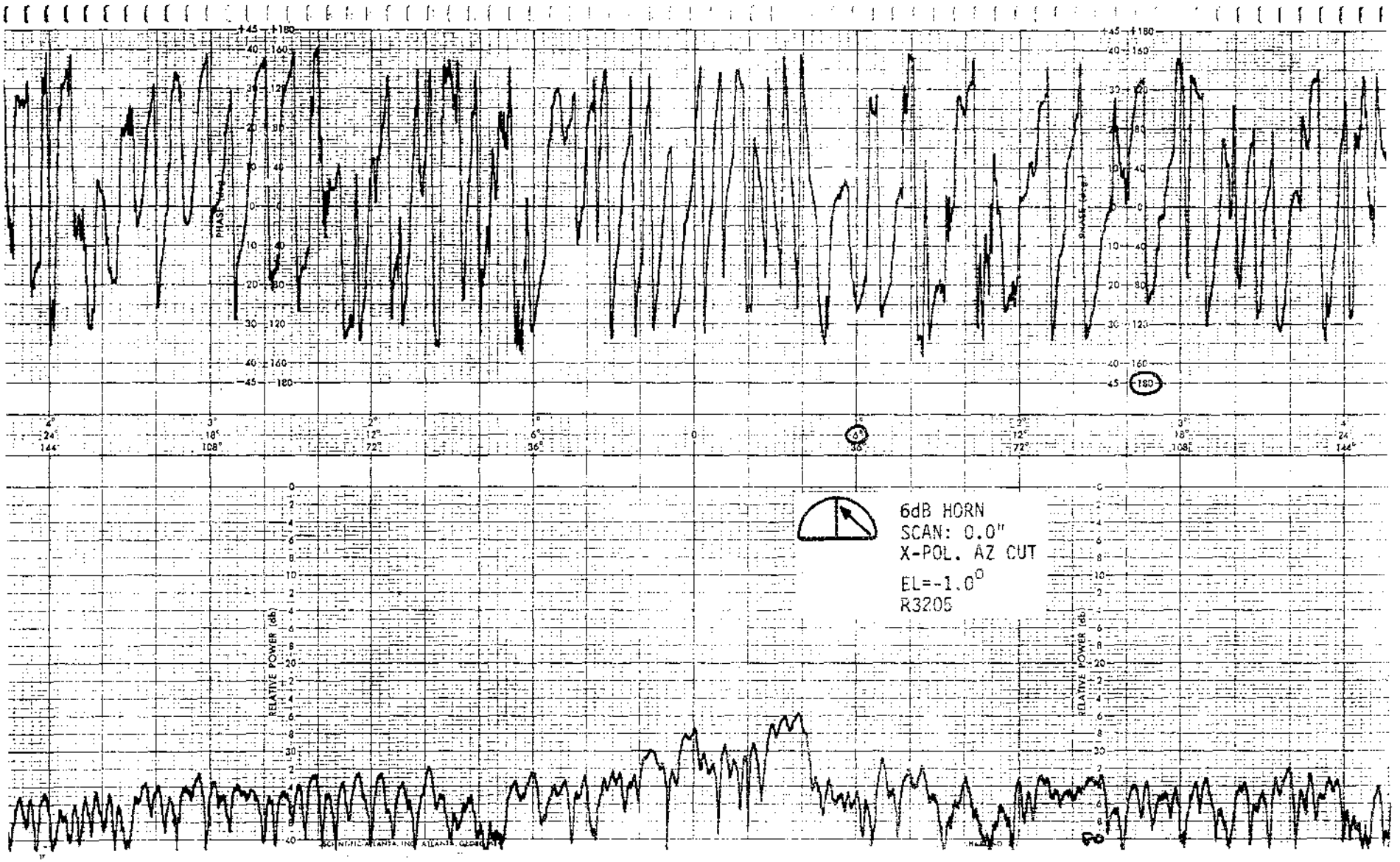

6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=-3.0°
R3107
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

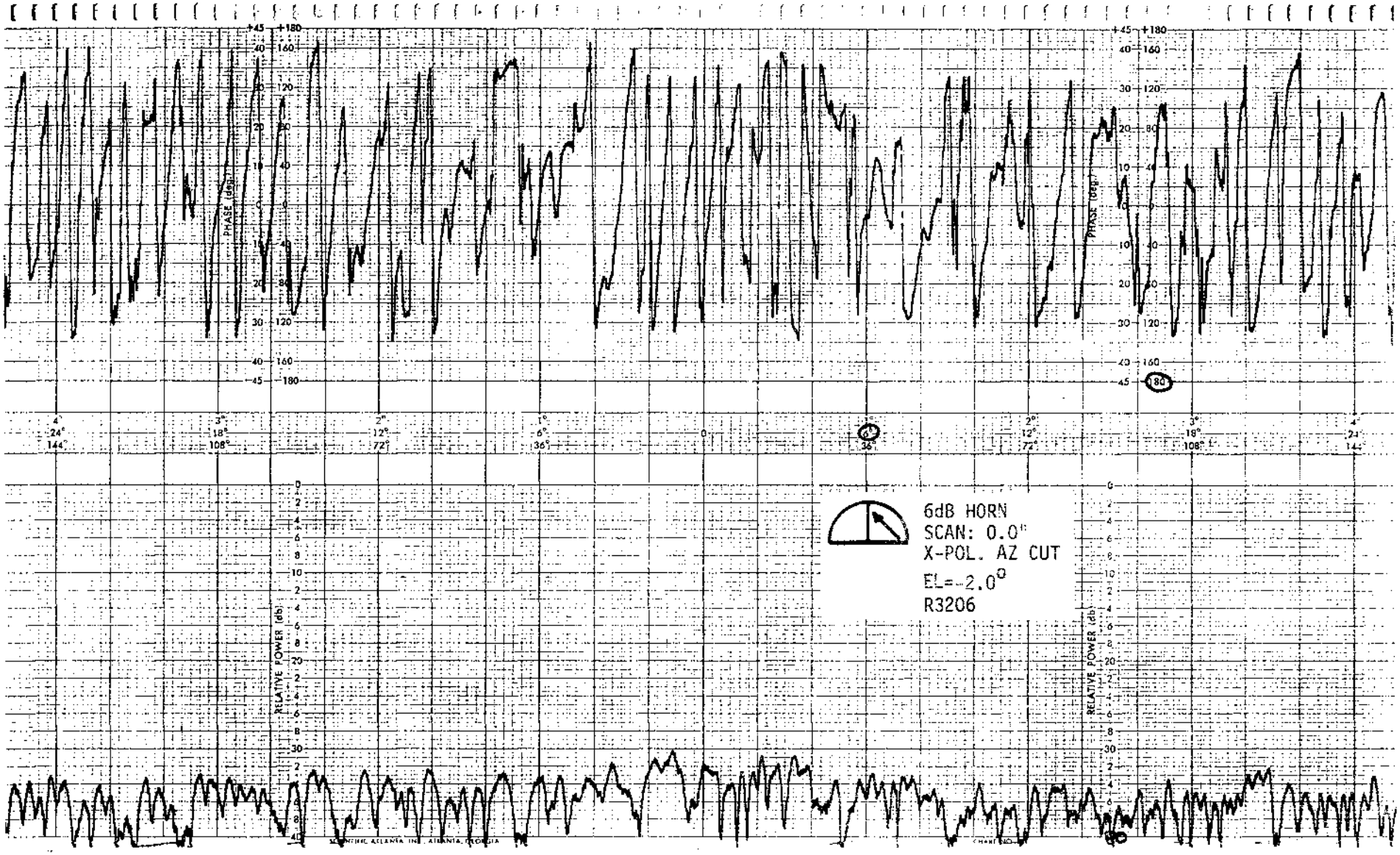

6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=+3.0°
R3201
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC ATLANTA, INC., ATLANTA, GEORGIA

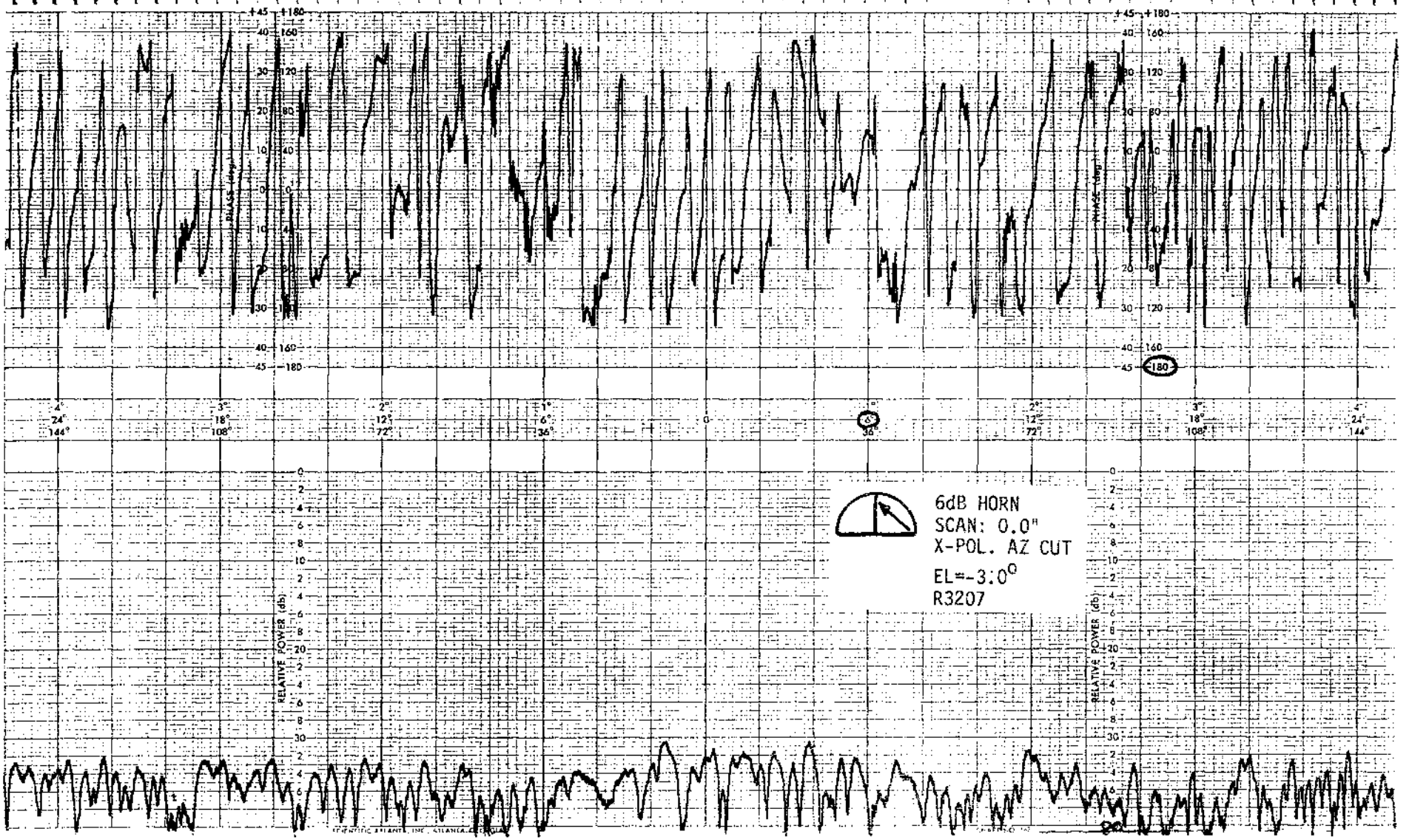

6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=+2.0°
R3202
PHASE (deg.)
RELATIVE POWER (db)


6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=+1.0°
R3203
PHASE (deg)
RELATIVE POWER (db)


PHASE (deg.)
RELATIVE POWER (db)
6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=0.0°
R3204
SCIENTIFIC-ATLANTA INC., ATLANTA, GEORGIA


6dB HORN
SCAN: 0.0°
X-POL. AZ CUT
EL=-1.0°
R3205
RELATIVE POWER (db)
PHASE (deg)

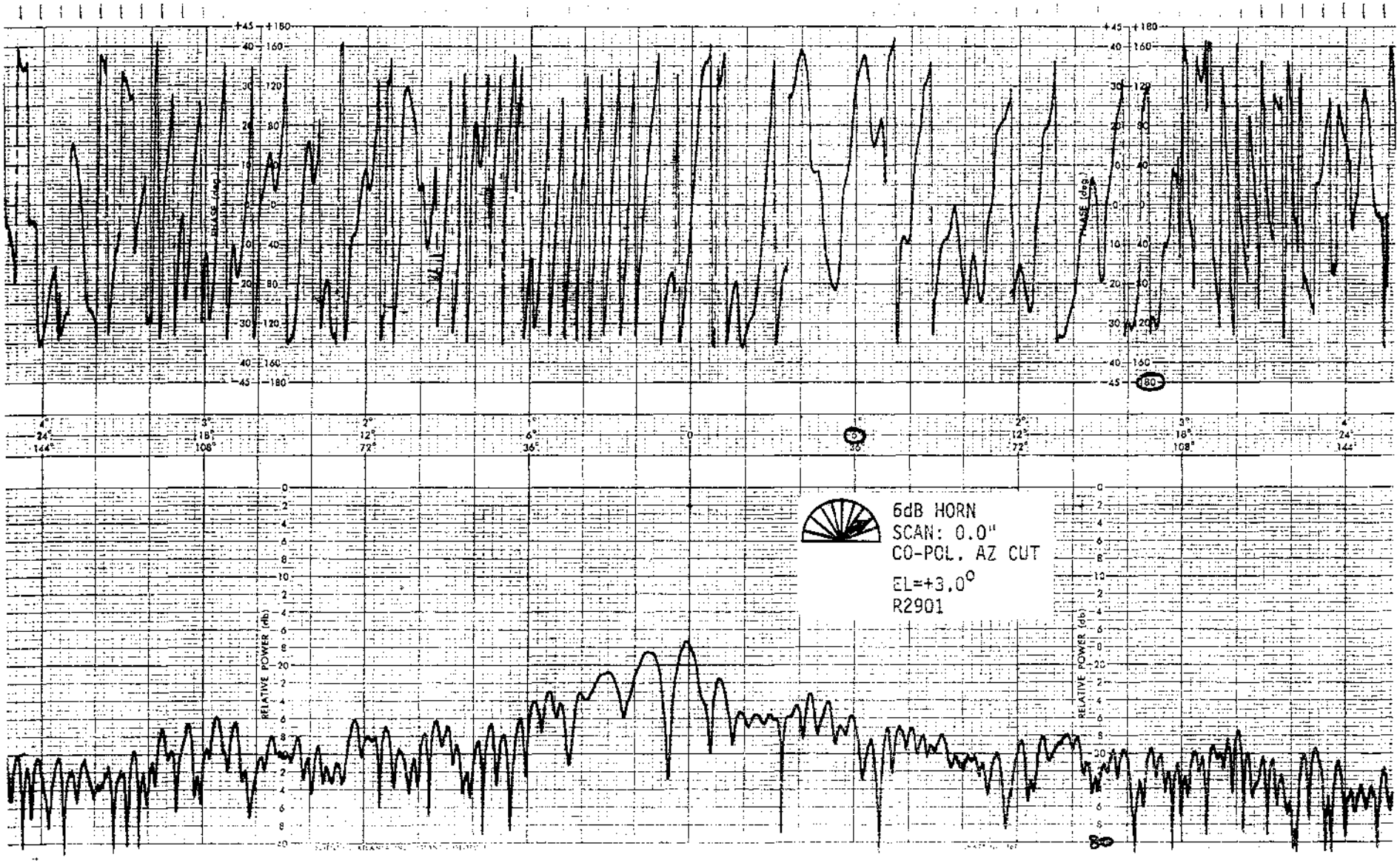

6dB HORN
SCAN: 0.0°
X-POL. AZ CUT
EL=-2.0°
R3206
PHASE (deg.)
RELATIVE POWER (db)

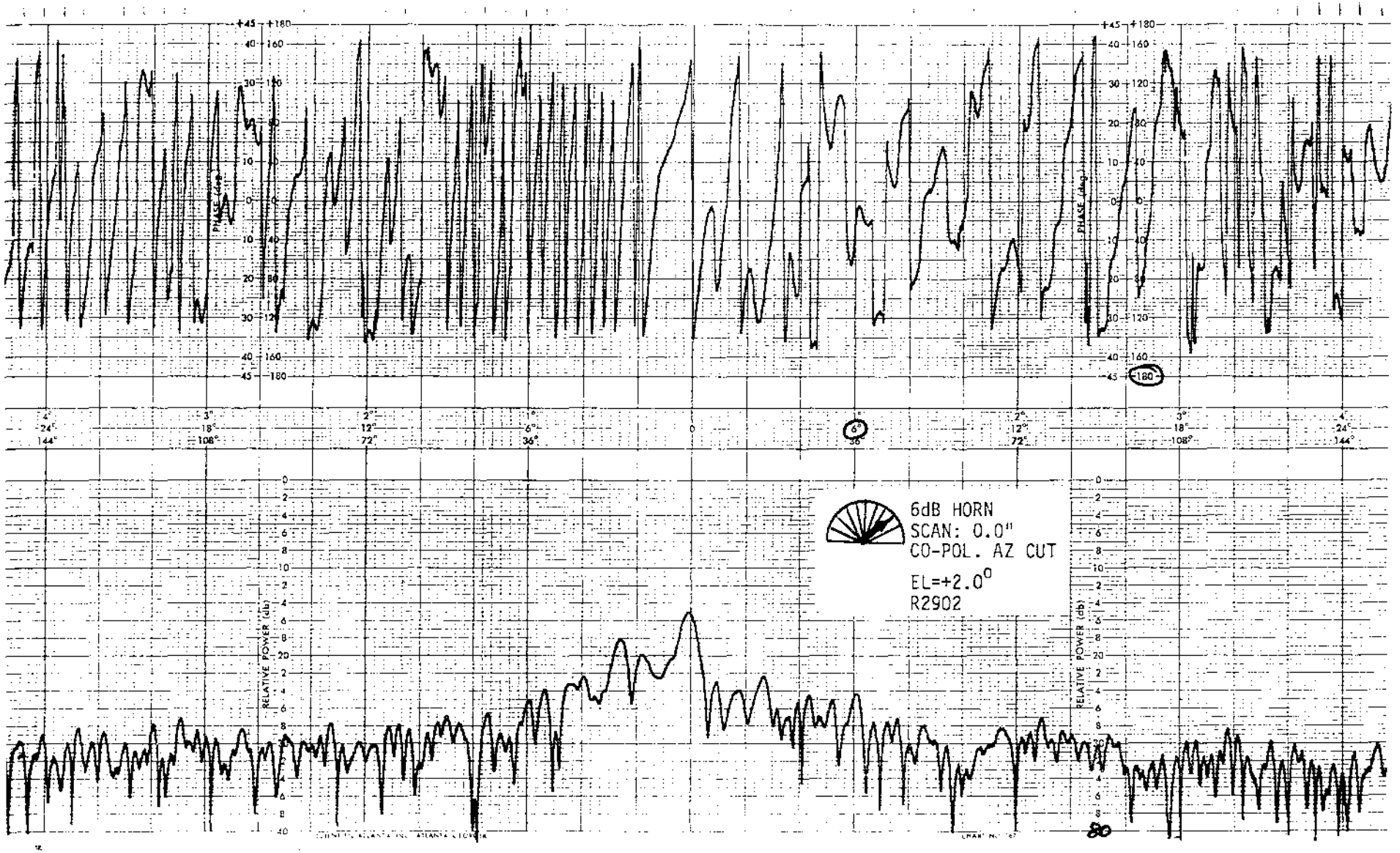

6dB HORN
SCAN: 0.0°
X-POL. AZ CUT
EL=-3.0°
R3207
RELATIVE POWER (db)

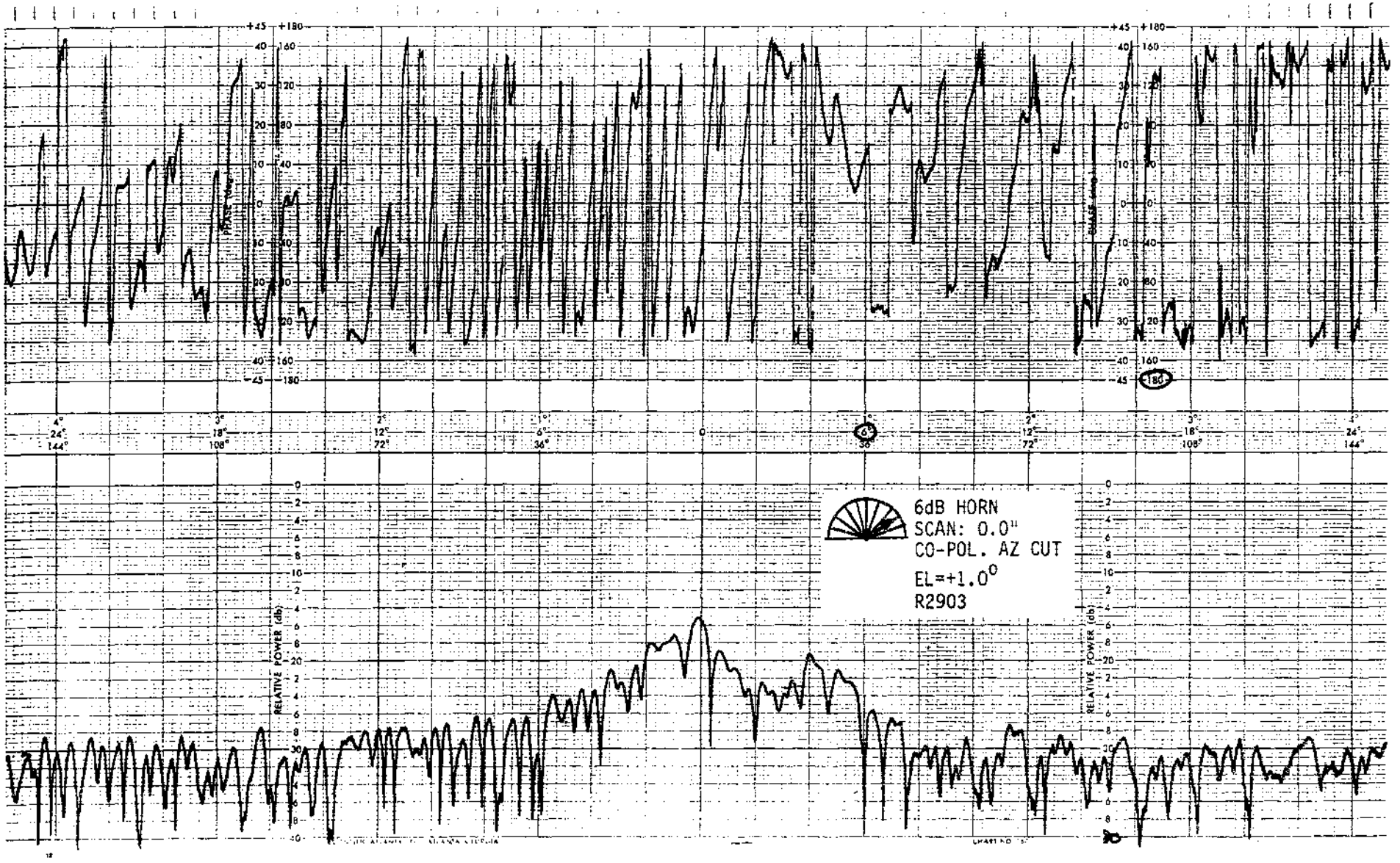
LSST - VI

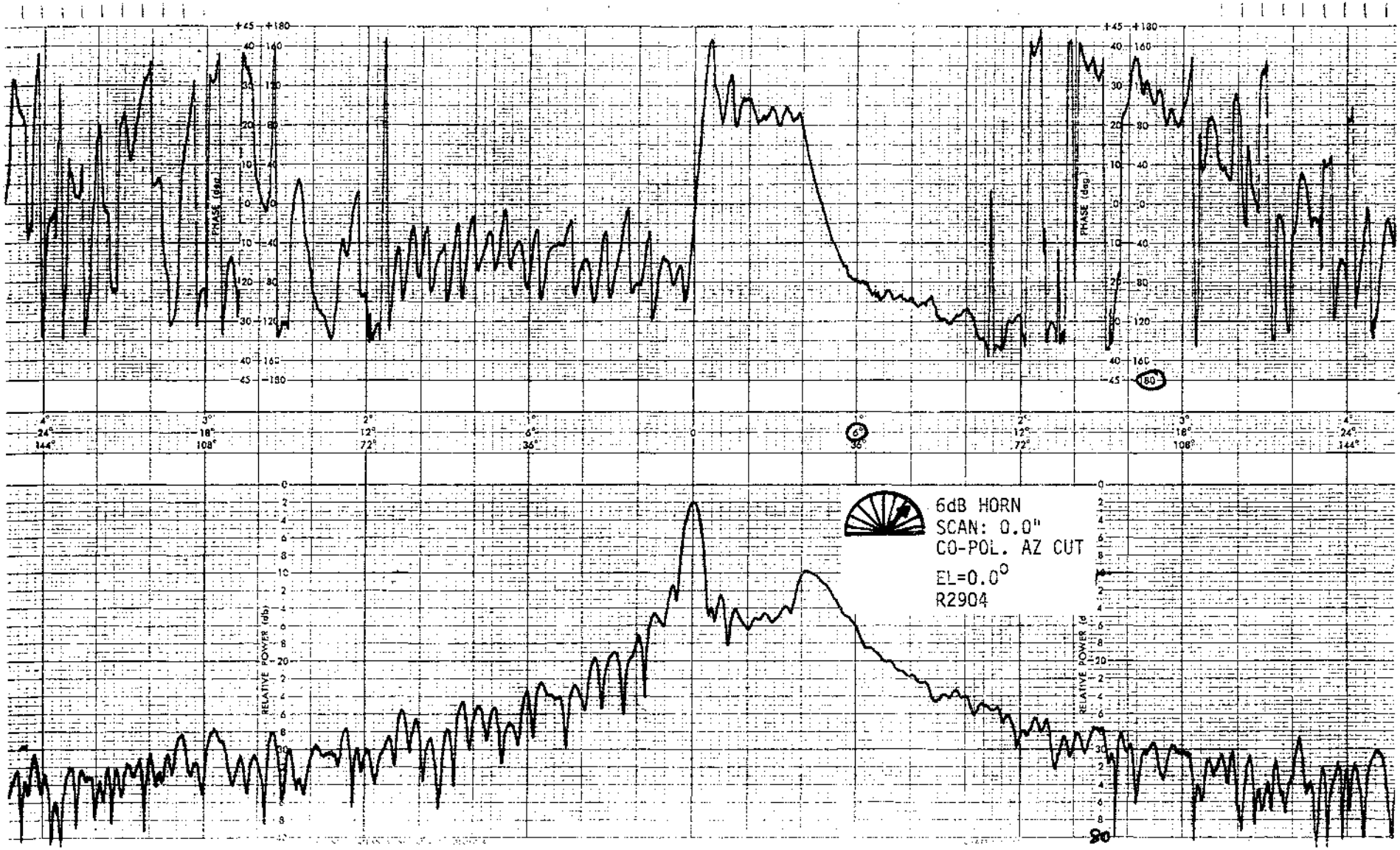
SECONDARY PATTERN LOG

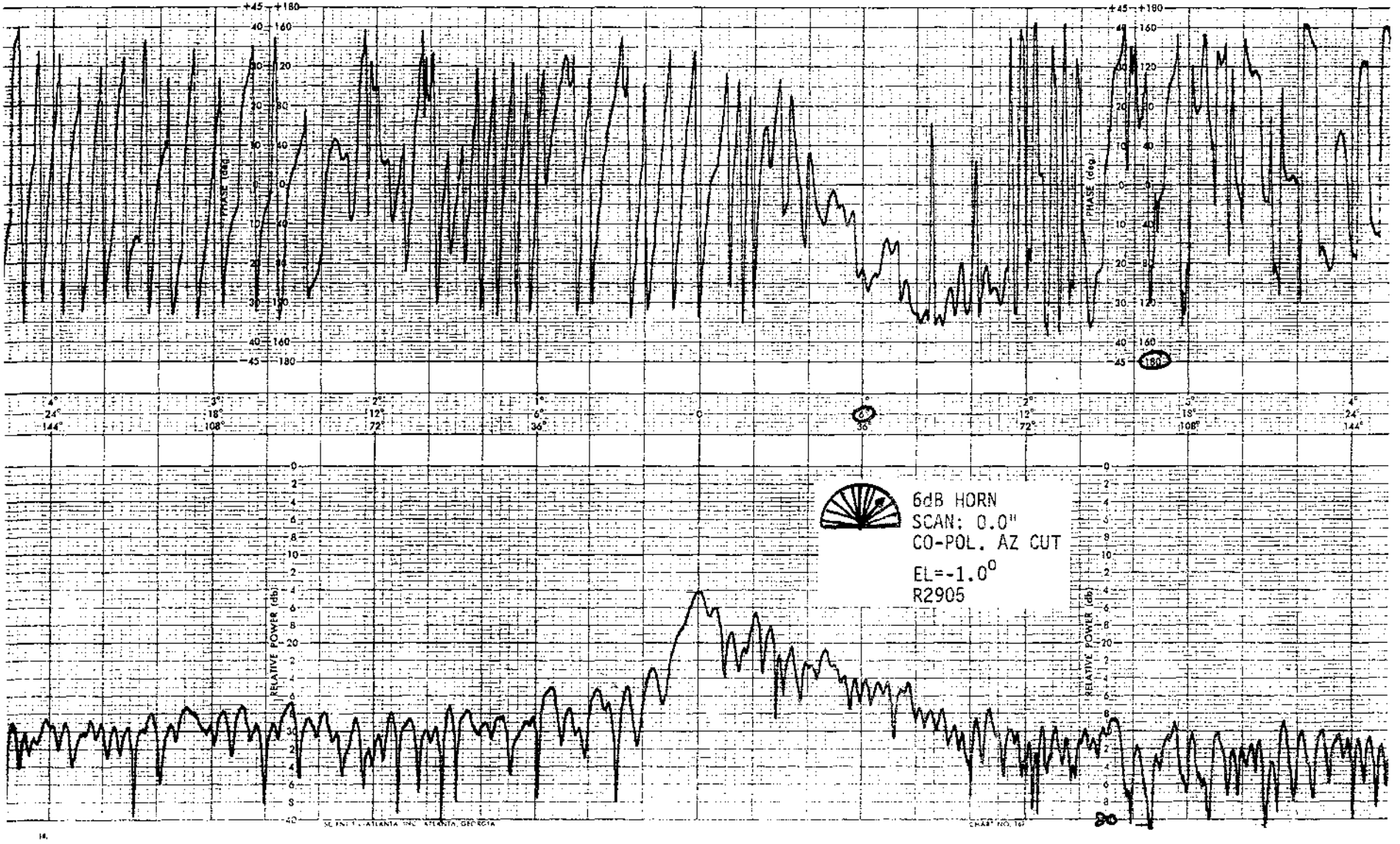
CONFIGURATION	HORN	SCAN	POL.	PK. GAIN	PATTERN	FILE NAME	PAGE NUMBER
	6 dB	0.0"	CO	-	$+3^{\circ}$EL $\pm$ 45°AZ	R2901	186
	"	"	"	-	$+2^{\circ}$EL "	R2902	187
	"	"	"	-	$+1^{\circ}$EL "	R2903	188
	"	"	"	50.80	0°EL "	R2904	189
	"	"	"	-	-1°EL "	R2905	190
	"	"	"	-	-2°EL "	R2906	191
	"	"	"	-	-3°EL "	R2907	192
	6 dB	0.0"	X	-	$+3^{\circ}$EL $\pm$ 45°AZ	R3001	193
	"	"	"	-	$+2^{\circ}$EL "	R3002	194
	"	"	"	-	$+1^{\circ}$EL "	R3003	195
	"	"	"	-	0°EL "	R3004	196
	"	"	"	-	-1°EL "	R3005	197
	"	"	"	-	-2°EL "	R3006	198
	"	"	"	-	-3°EL "	R3007	199
	6 dB	0.0"	CO	-	$+3^{\circ}$EL $\pm$ 45°AZ	R2701	200
	"	"	"	-	$+2^{\circ}$EL "	R2702	201
	"	"	"	-	$+1^{\circ}$EL "	R2703	202
	"	"	"	50.65	0°EL "	R2704	203
	"	"	"	-	-1°EL "	R2705	204
	"	"	"	-	-2°EL "	R2706	205
	"	"	"	-	-3°EL "	R2707	206
	6 dB	0.0"	X	-	$+3^{\circ}$EL $\pm$ 45°AZ	R2801	207
	"	"	"	-	$+2^{\circ}$EL "	R2802	208
	"	"	"	-	$+1^{\circ}$EL "	R2803	209
	"	"	"	-	0°EL "	R2804	210
	"	"	"	-	-1°EL "	R2805	211
	"	"	"	-	-2°EL "	R2806	212
	"	"	"	-	-3°EL "	R2807	213

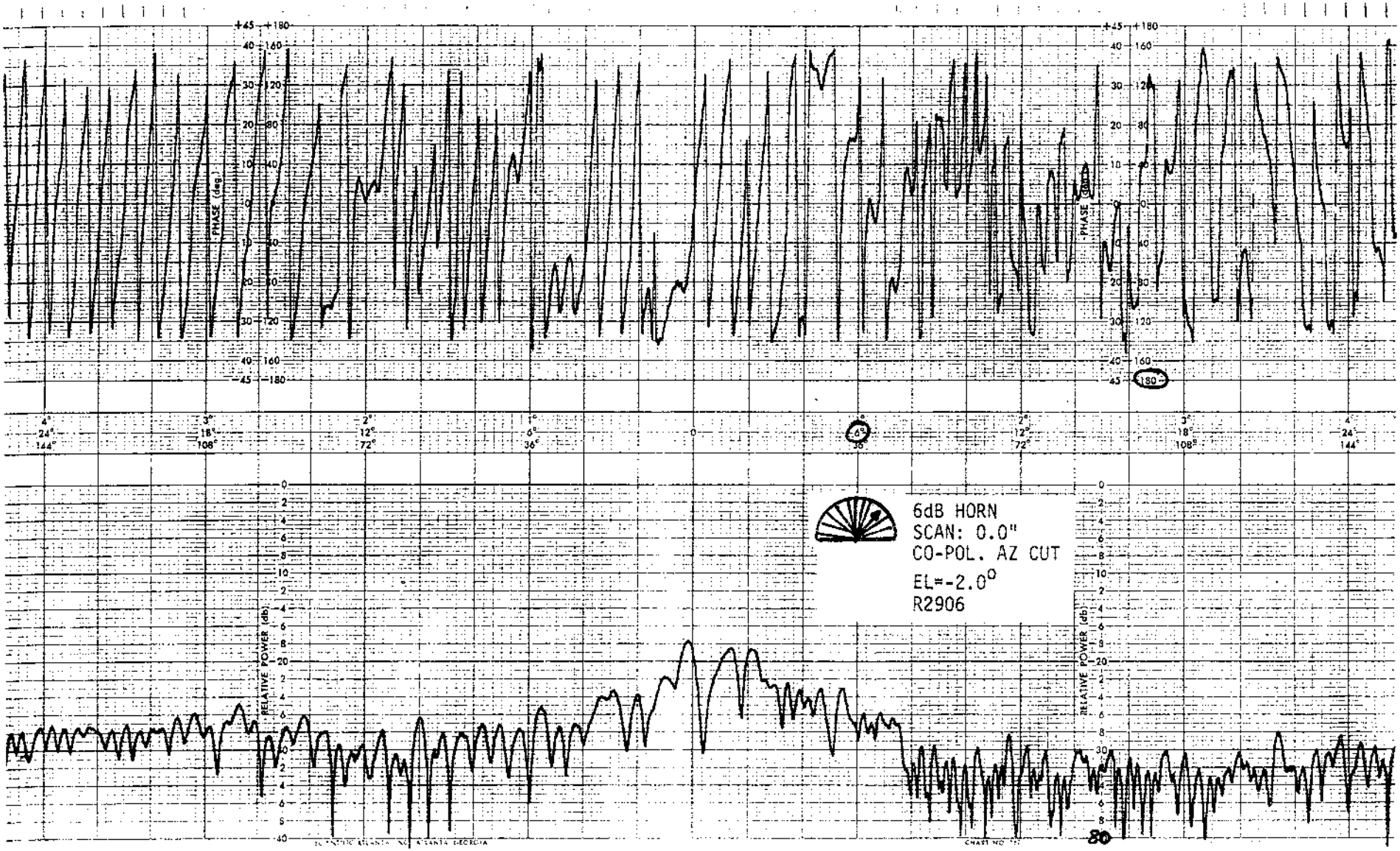

6dB HORN
SCAN: 0.0°
CO-POL. AZ CUT
EL=+3.0°
R2901
RELATIVE POWER (db)
PHASE (deg)

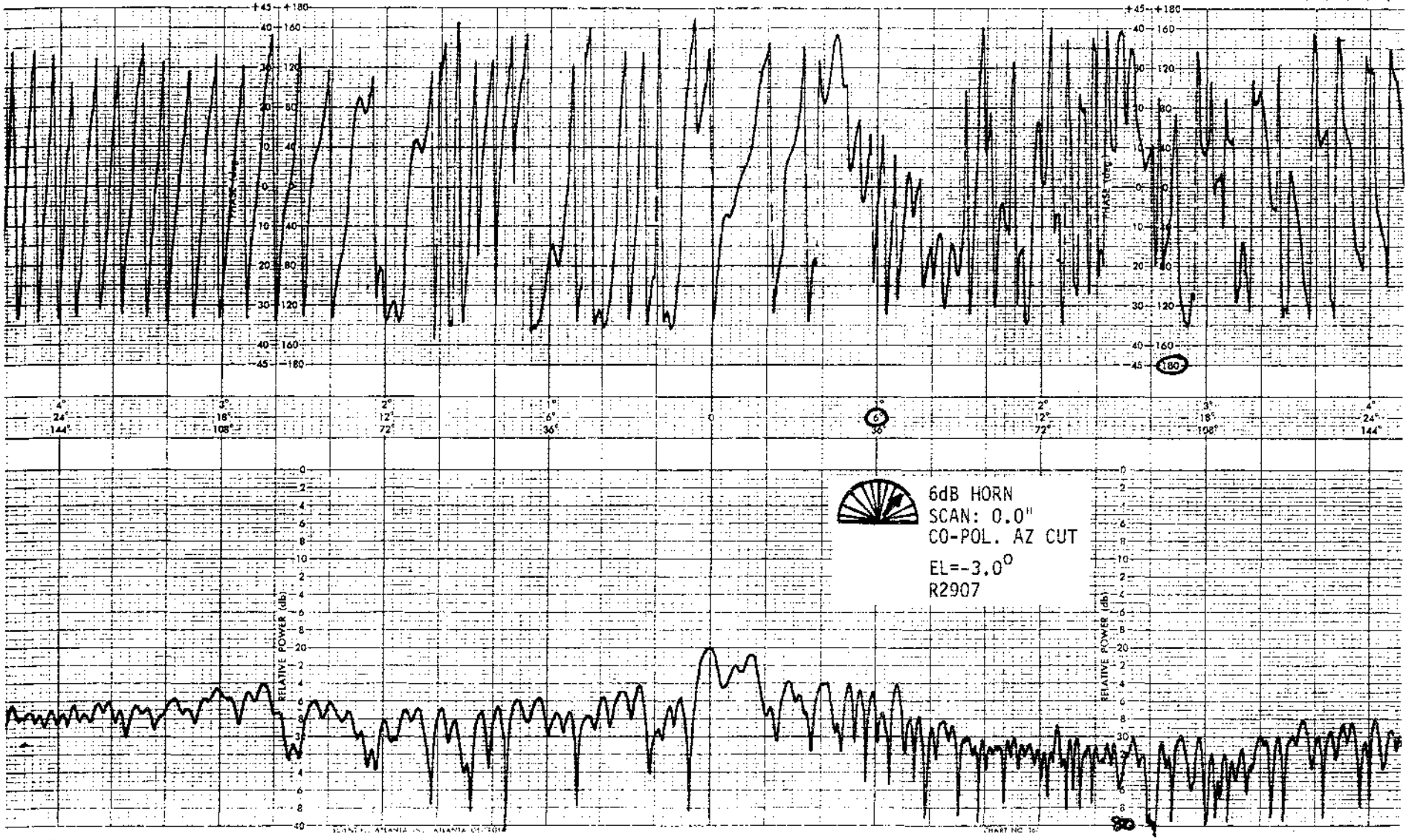

6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=+2.0°
R2902
PHASE (deg.)
RELATIVE POWER (db)

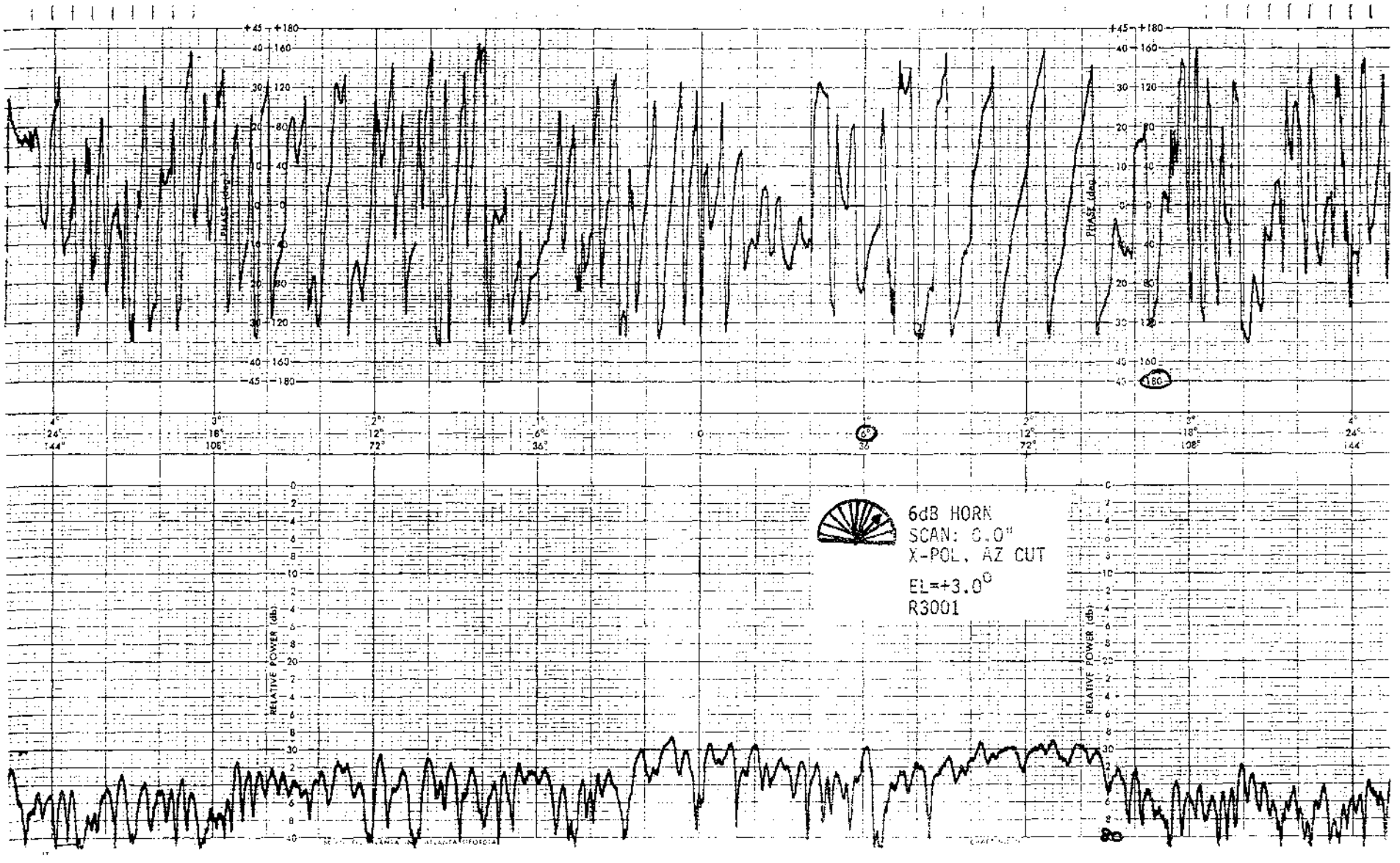

6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=+1.0°
R2903
RELATIVE POWER (db)
PHASE (deg)

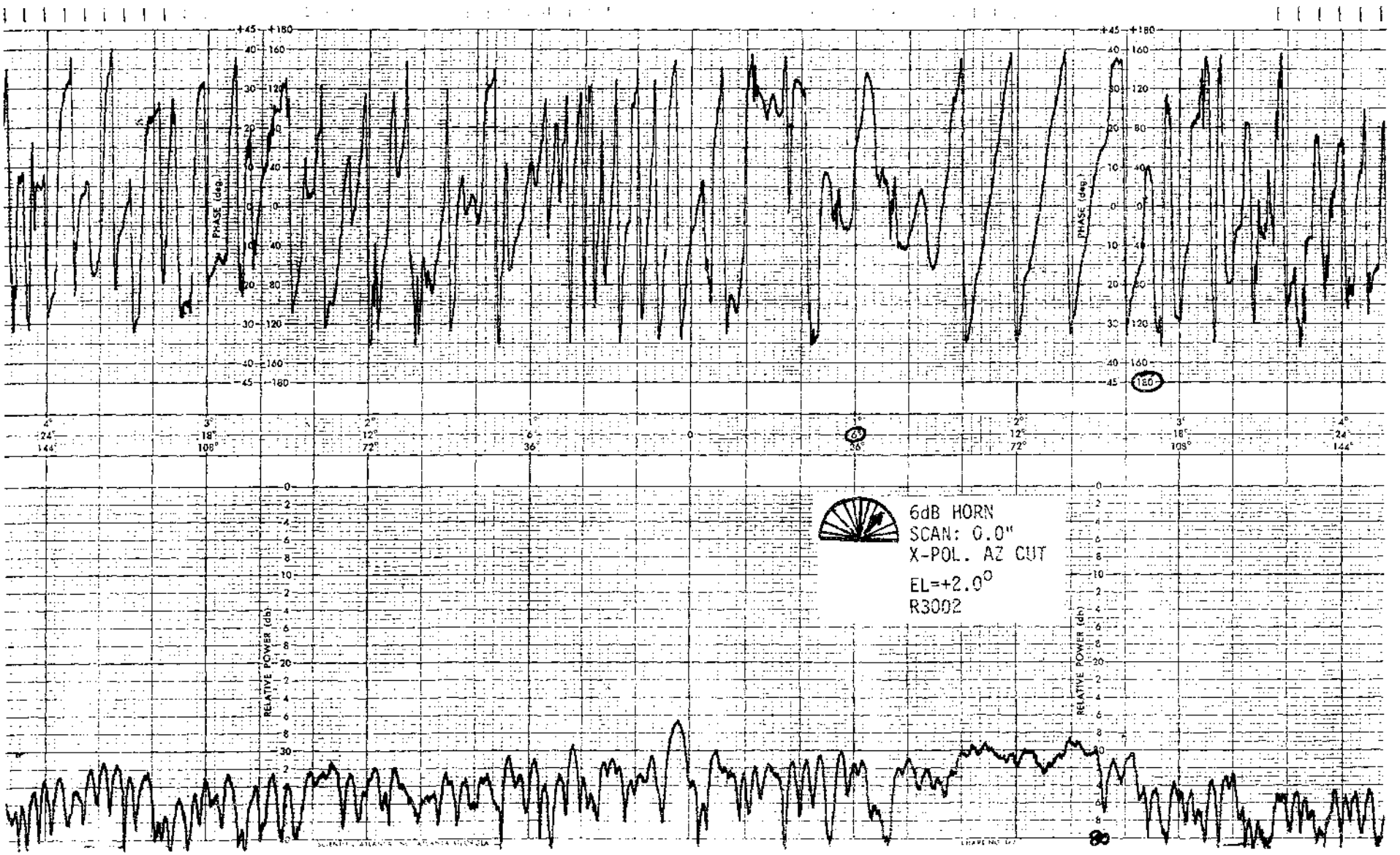

6dB HORN
SCAN: 0.0°
CO-POL. AZ CUT
EL=0.0°
R2904
PHASE (deg)
RELATIVE POWER (db)

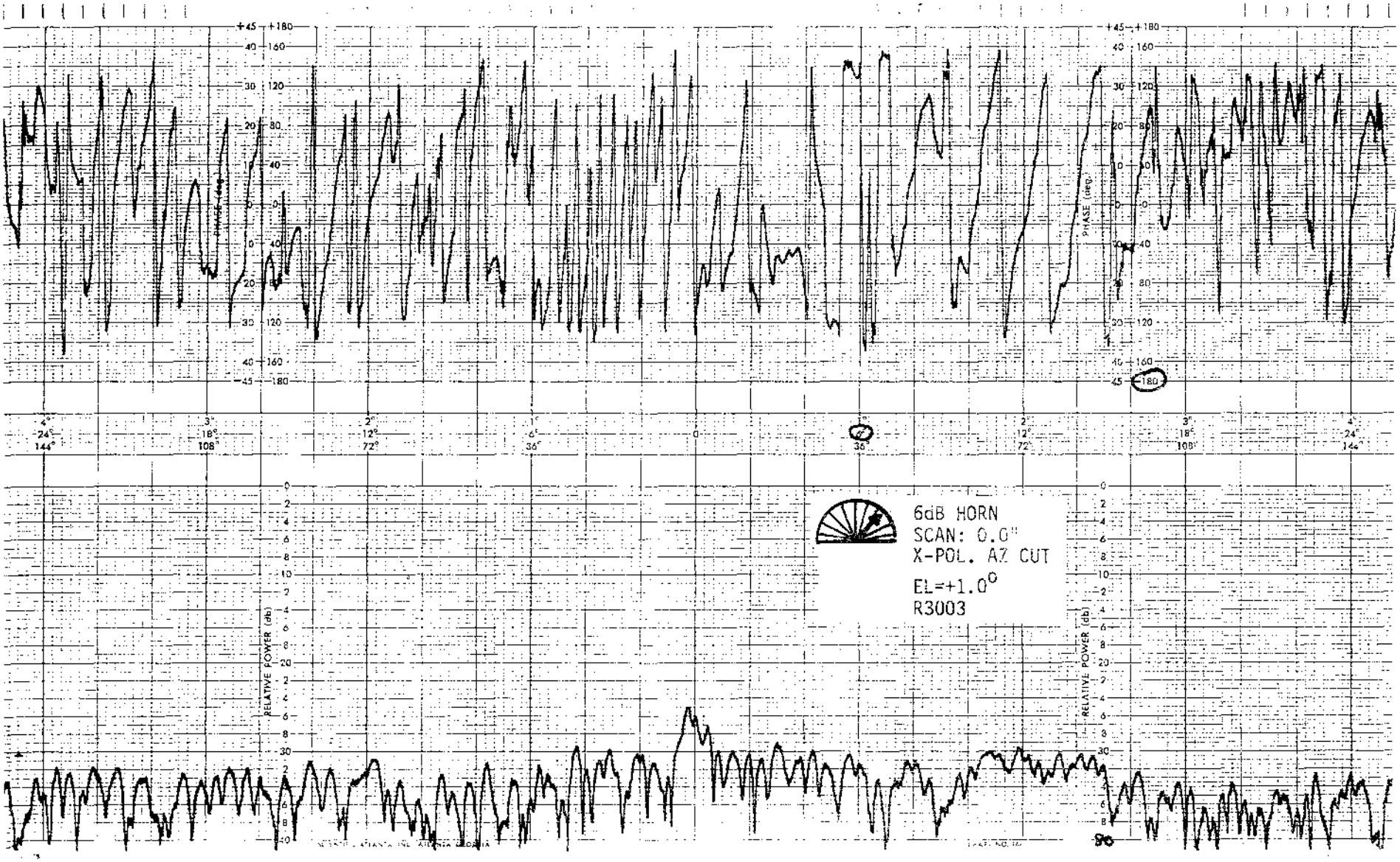

6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=-1.0°
R2905
PHASE (deg.)
RELATIVE POWER (db)

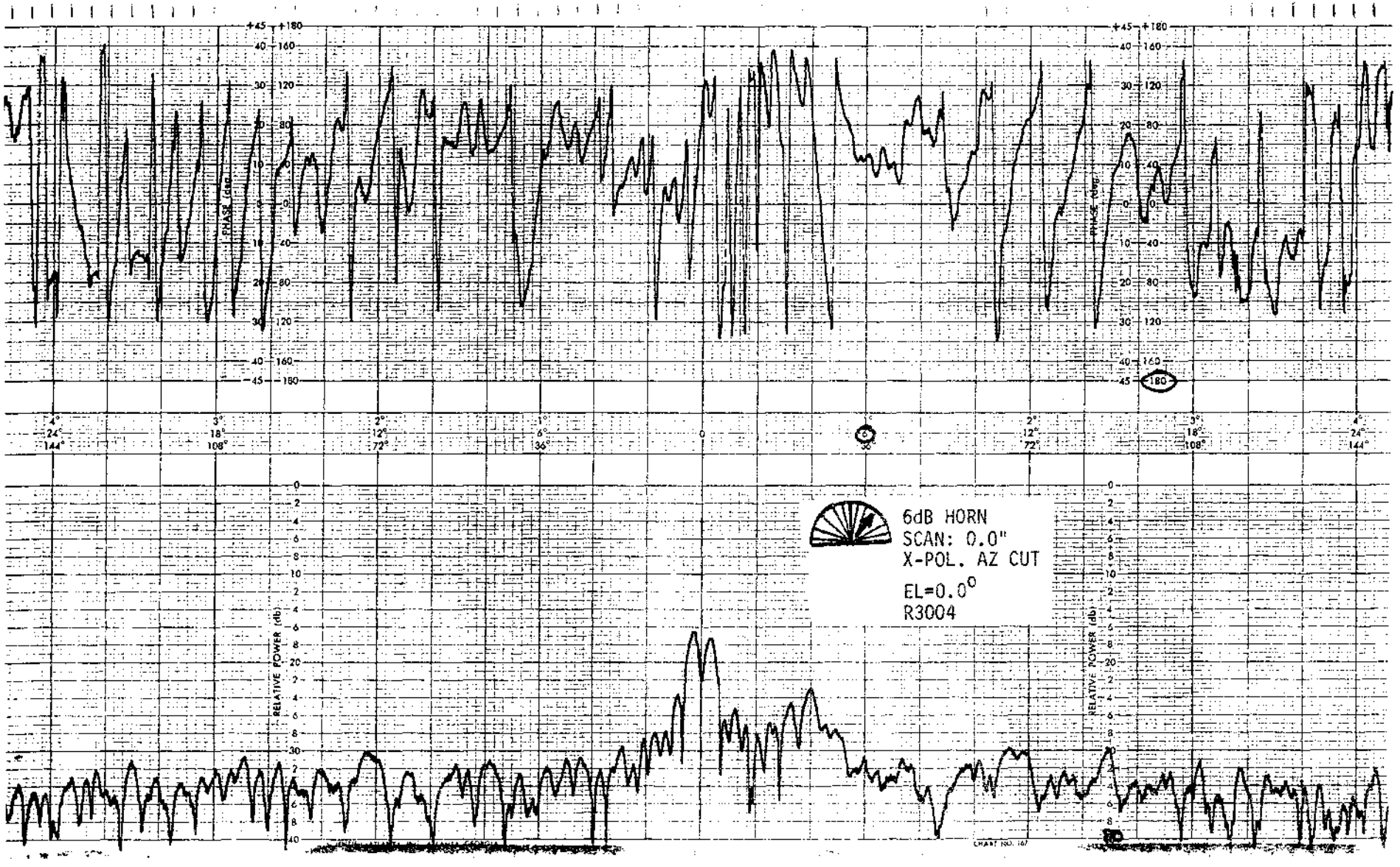

6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=-2.0°
R2906
PHASE (deg)
RELATIVE POWER (db)

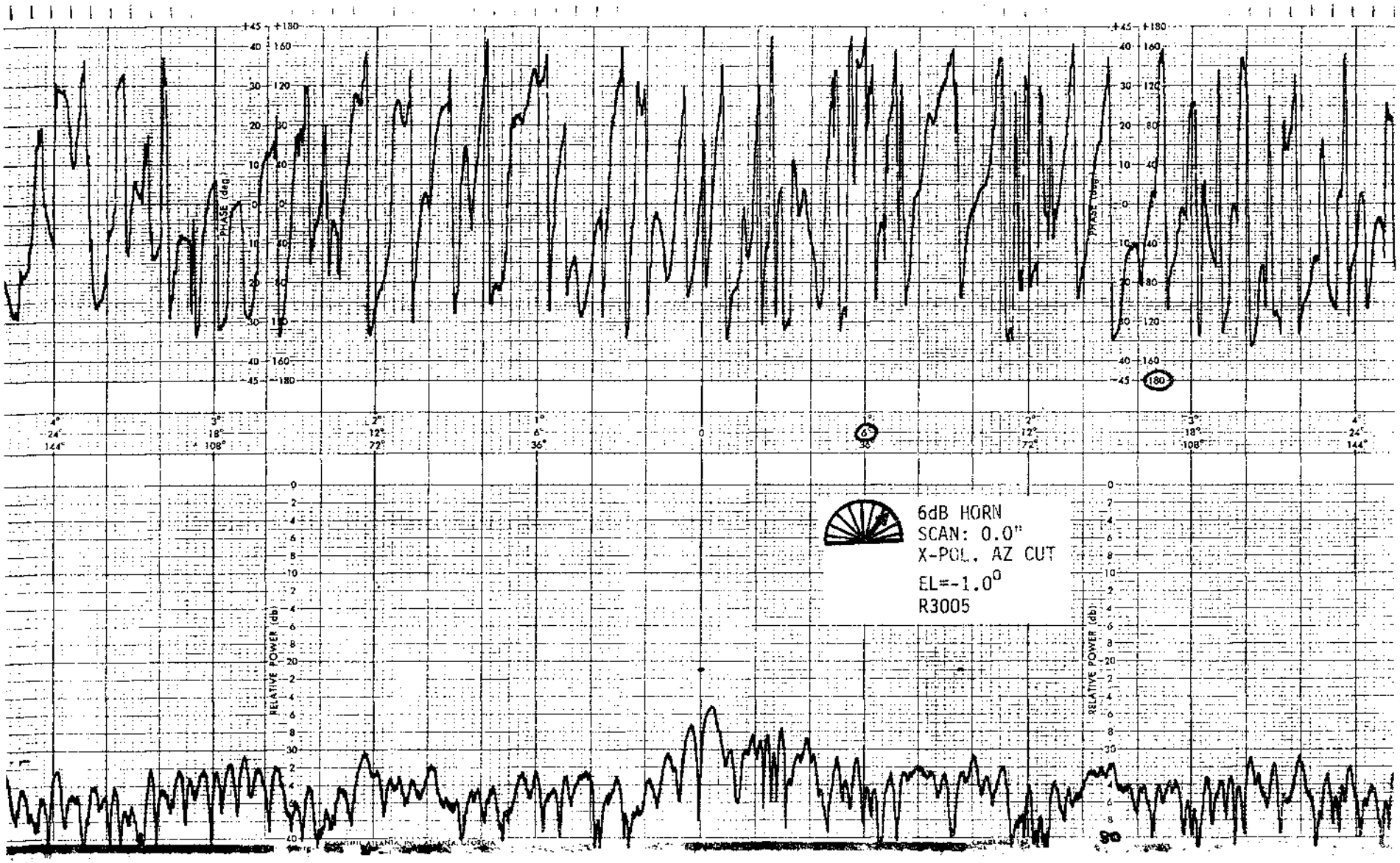

6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=-3.0°
R2907
RELATIVE POWER (dB)
PHASE (deg)

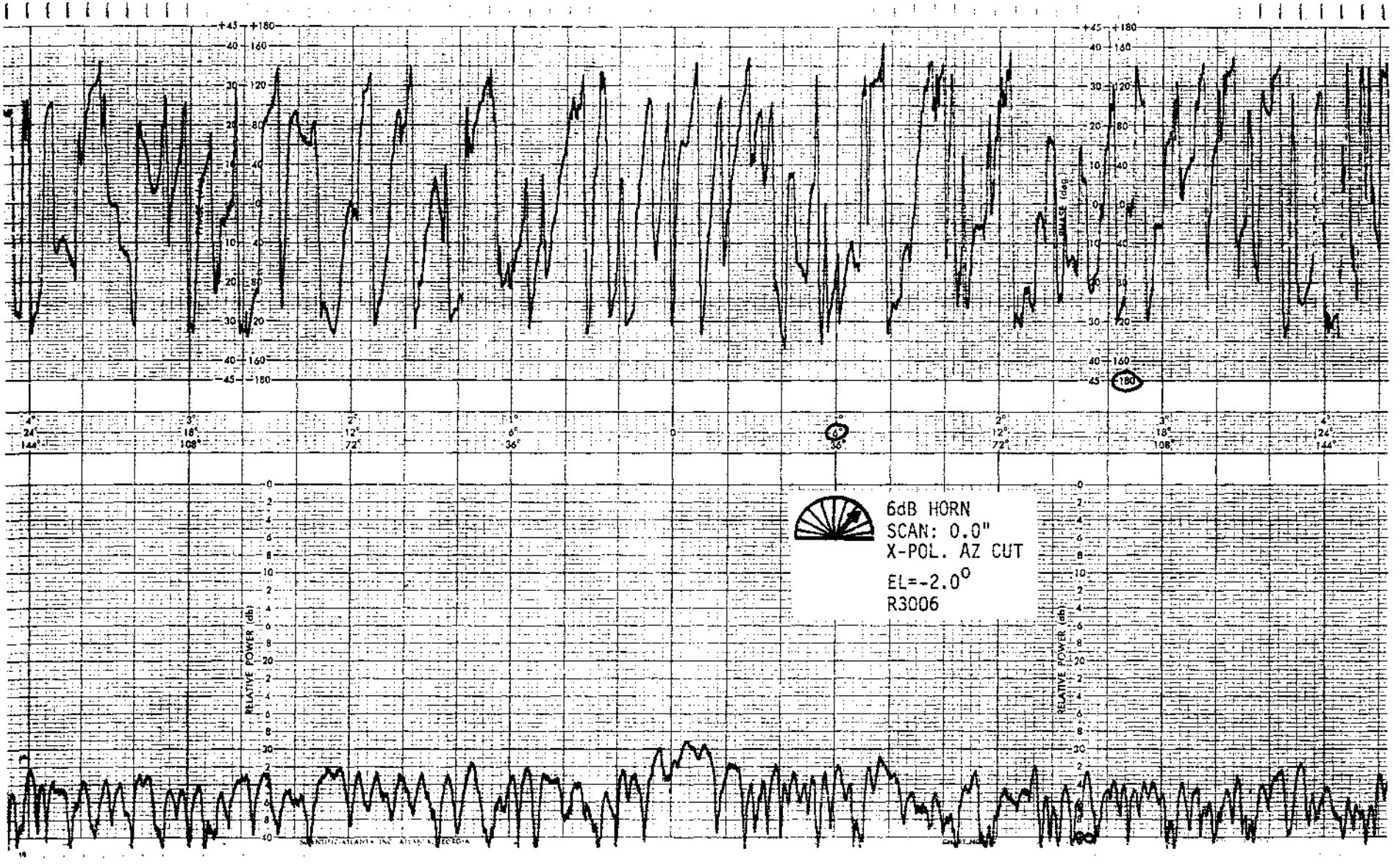

6dB HORN
SCAN: 6.0°
X-POL, AZ CUT
EL=+3.0°
R3001
PHASE (deg)
RELATIVE POWER (db)

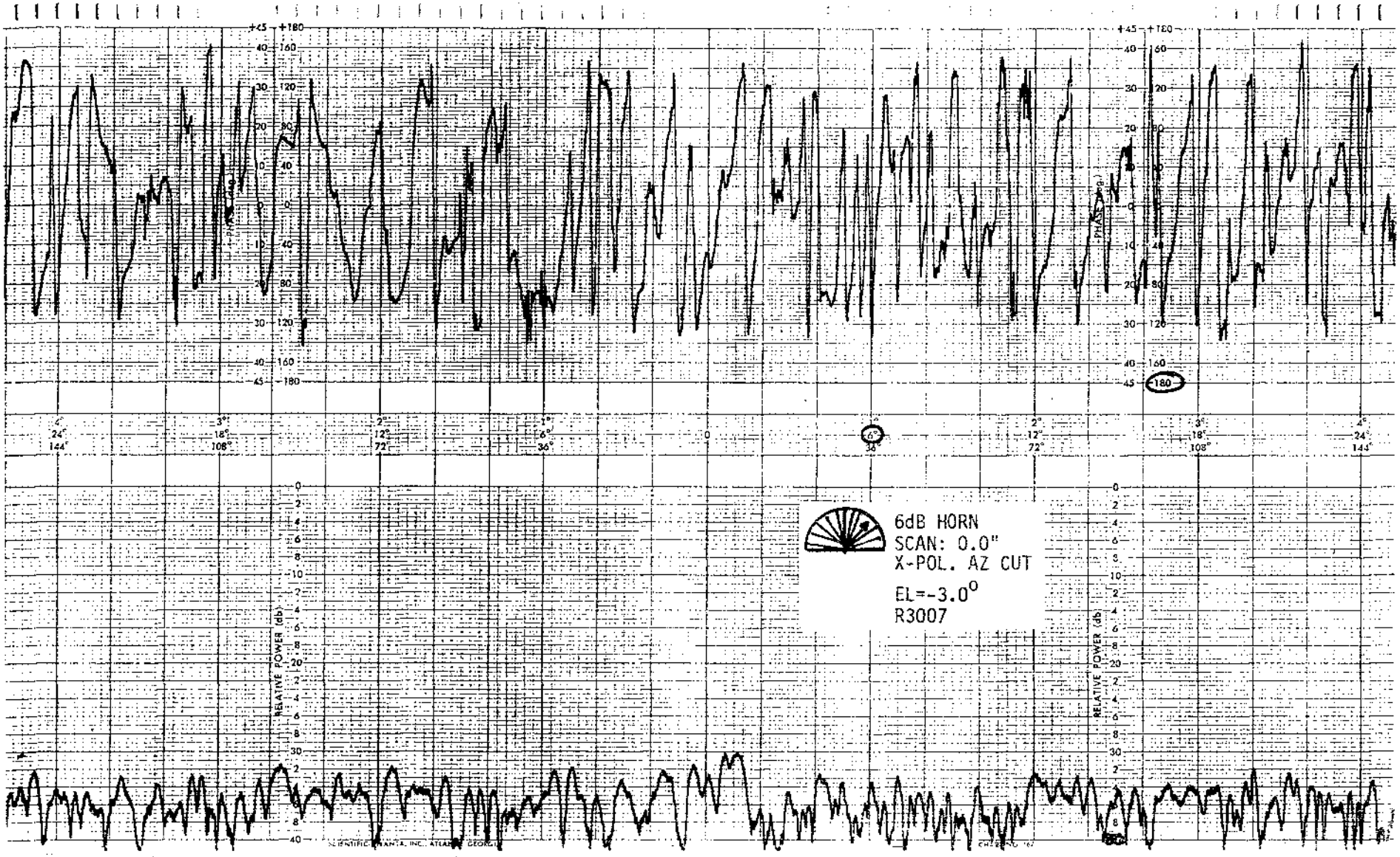

PHASE (deg.)
RELATIVE POWER (db)
6dB HORN
SCAN: 0.0°
X-POL. AZ CUT
EL=+2.0°
R3002

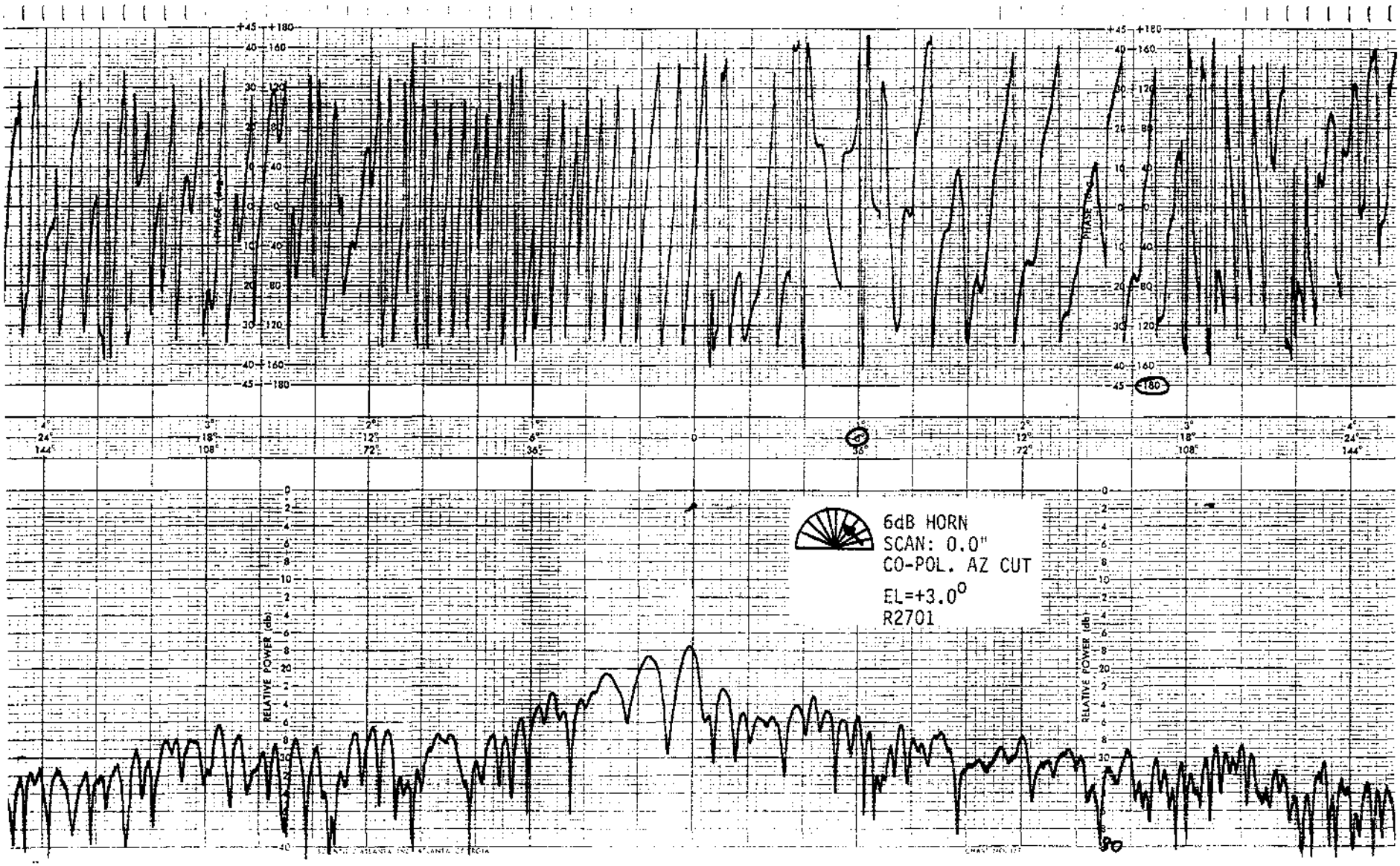

6dB HORN
SCAN: 0.0°
X-POL. AZ CUT
EL=+1.0°
R3003
PHASE (deg)
RELATIVE POWER (db)

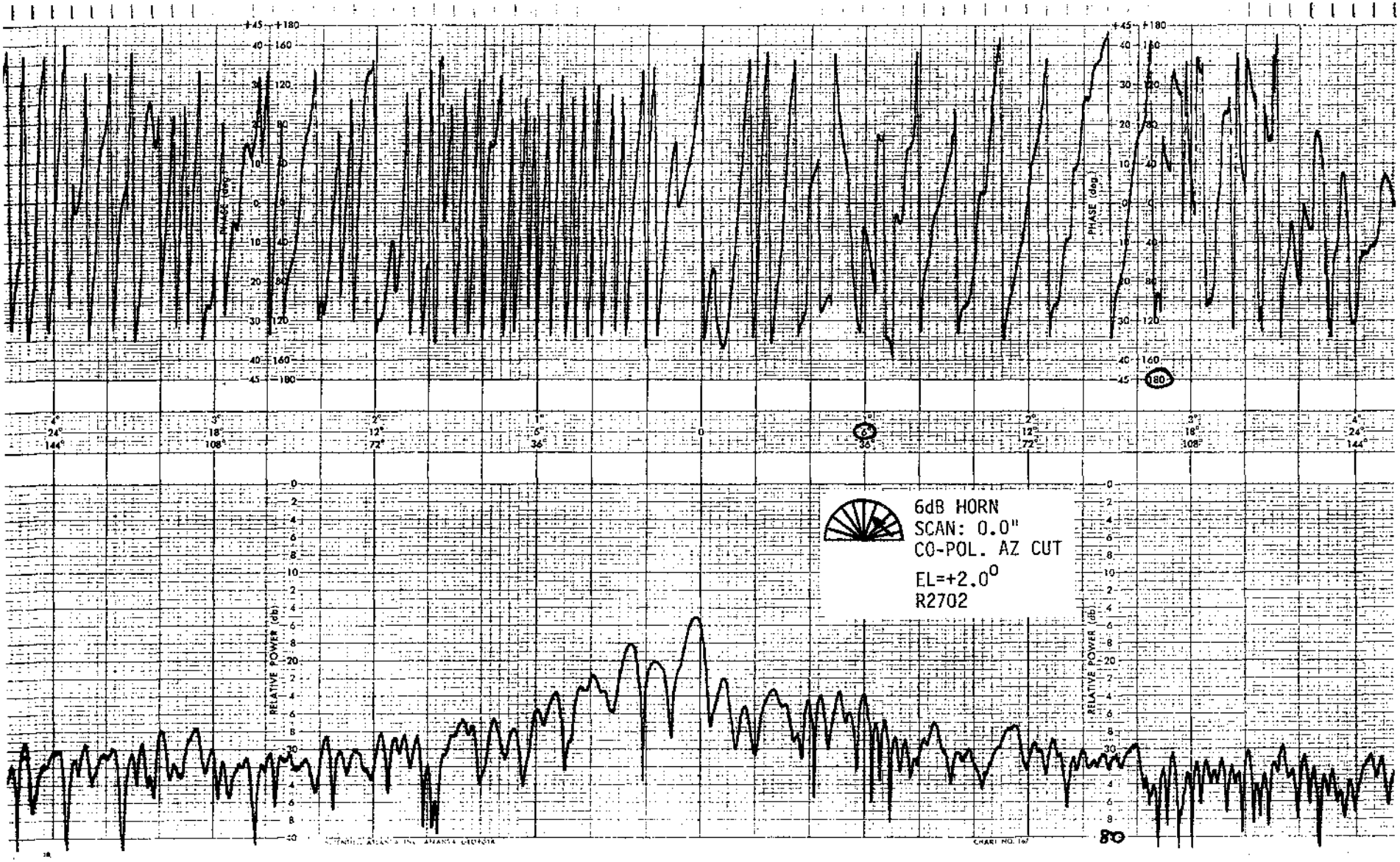

6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=0.0°
R3004
PHASE (deg)
RELATIVE POWER (db)

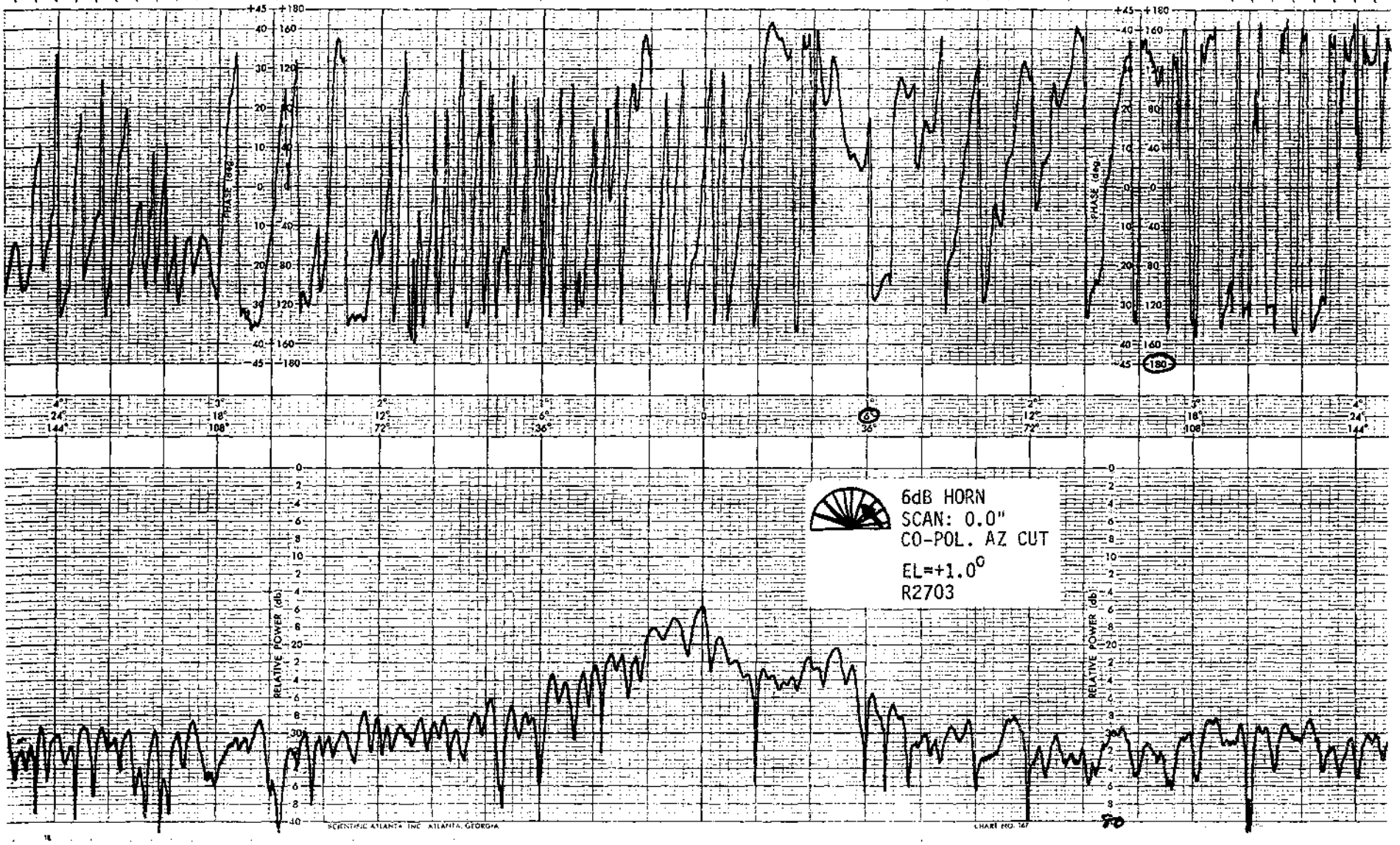

6dB HORN
SCAN: 0.0°
X-POL. AZ CUT
EL=-1.0°
R3005
PHASE (deg)
RELATIVE POWER (db)

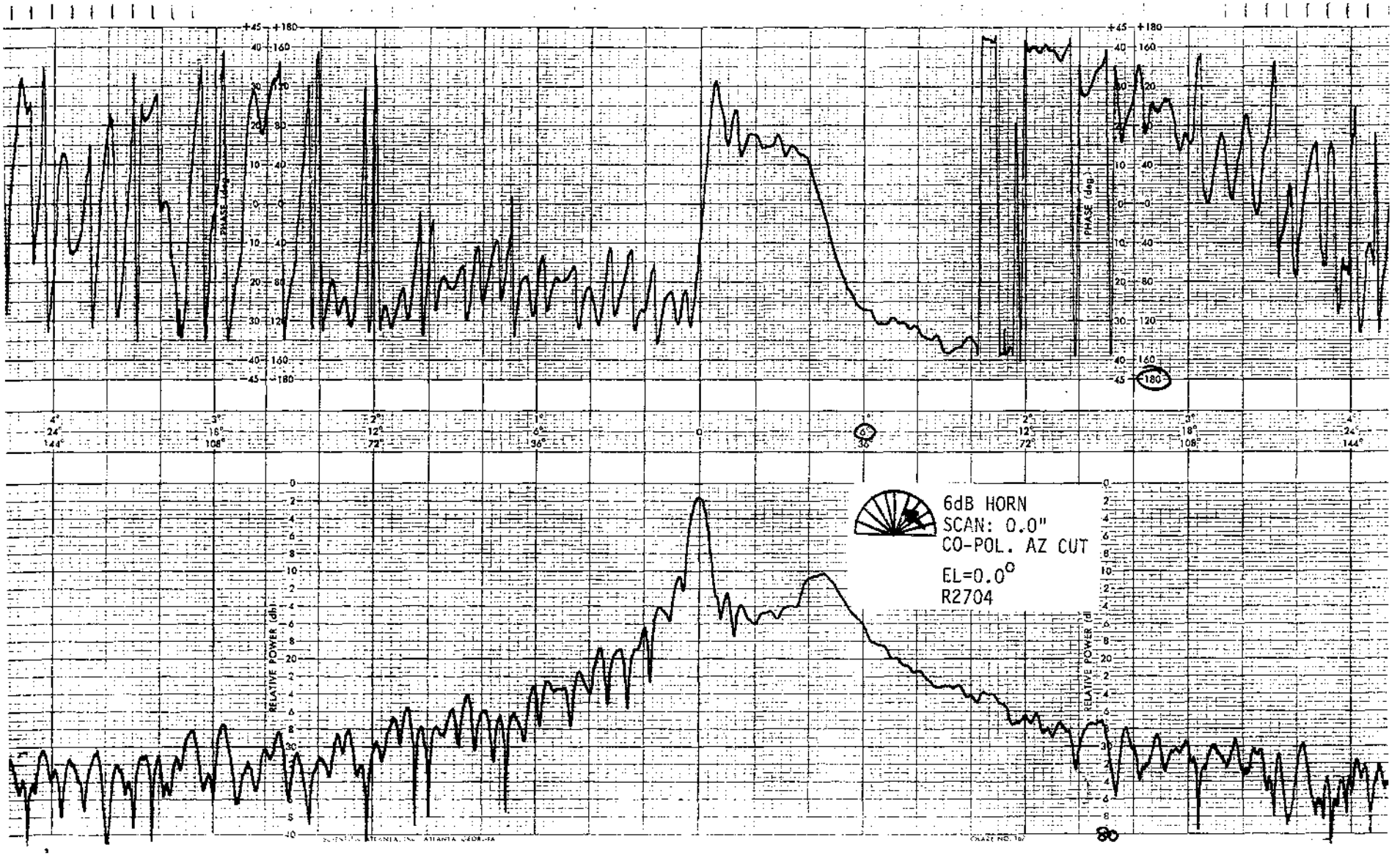

6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=-2.0°
R3006
RELATIVE POWER (db)
PHASE (deg)

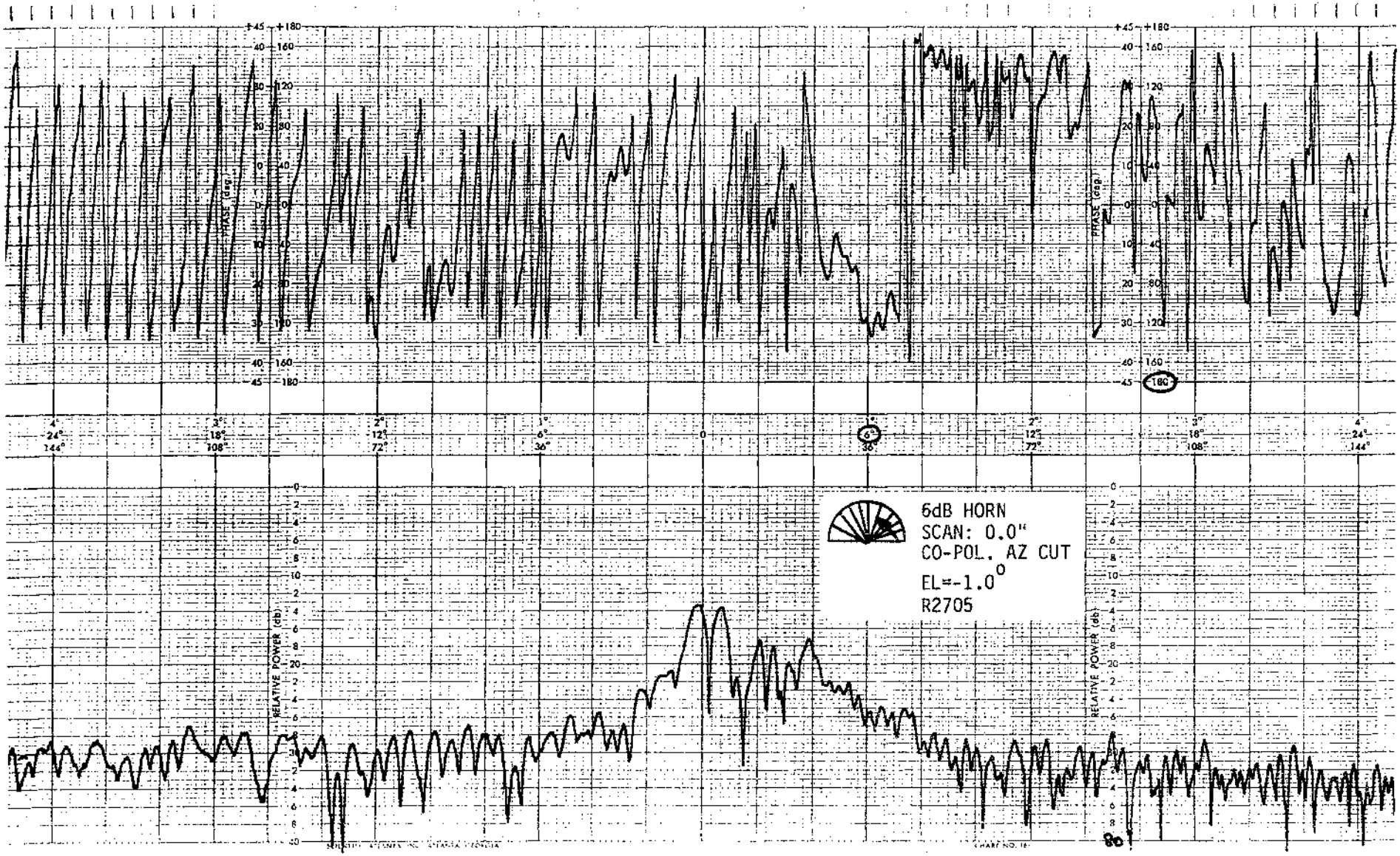

6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=-3.0°
R3007
RELATIVE POWER (db)
PHASE (deg)

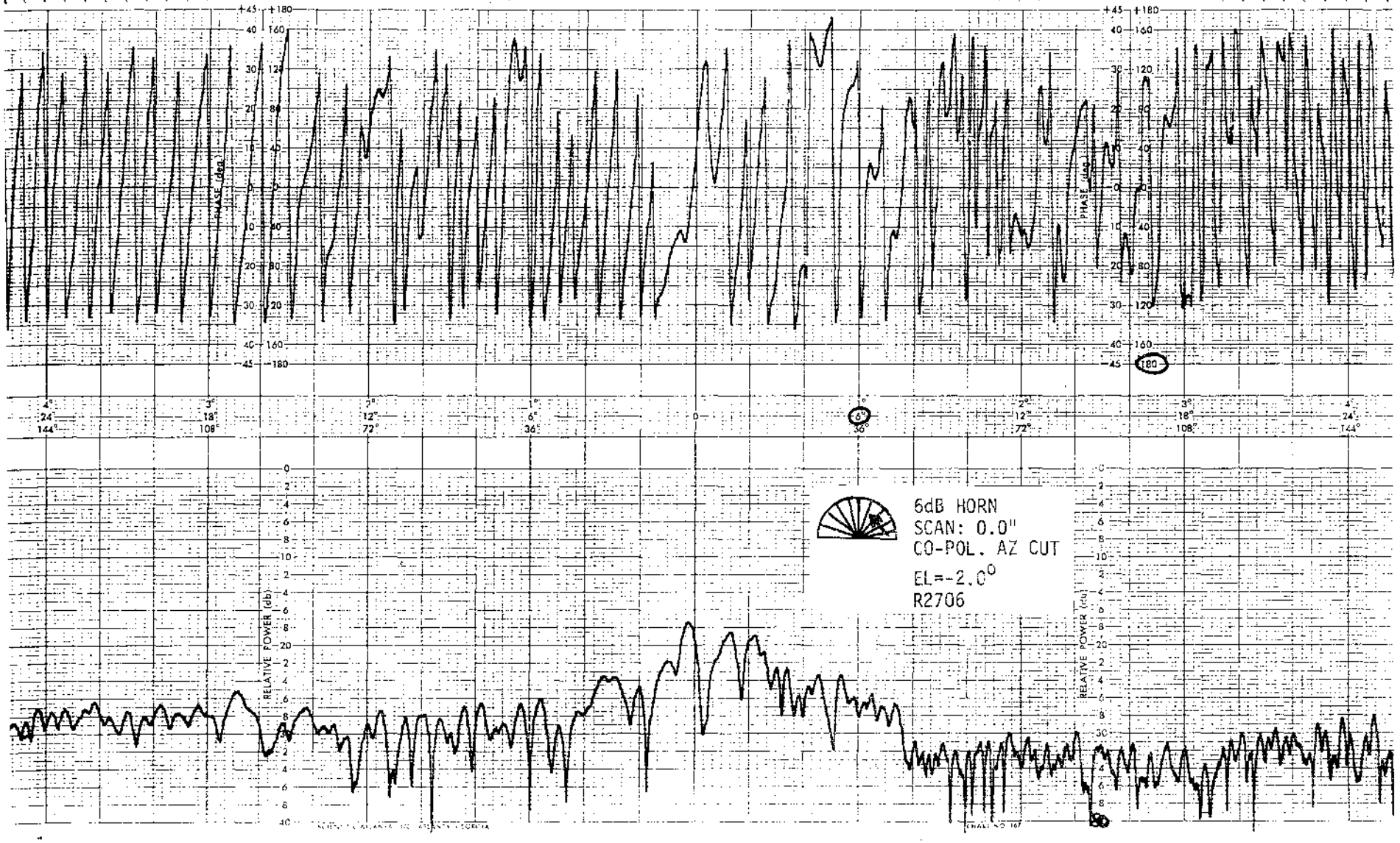

6dB HORN
SCAN: 0.0°
CO-POL. AZ CUT
EL=+3.0°
R2701
RELATIVE POWER (db)
PHASE (deg)

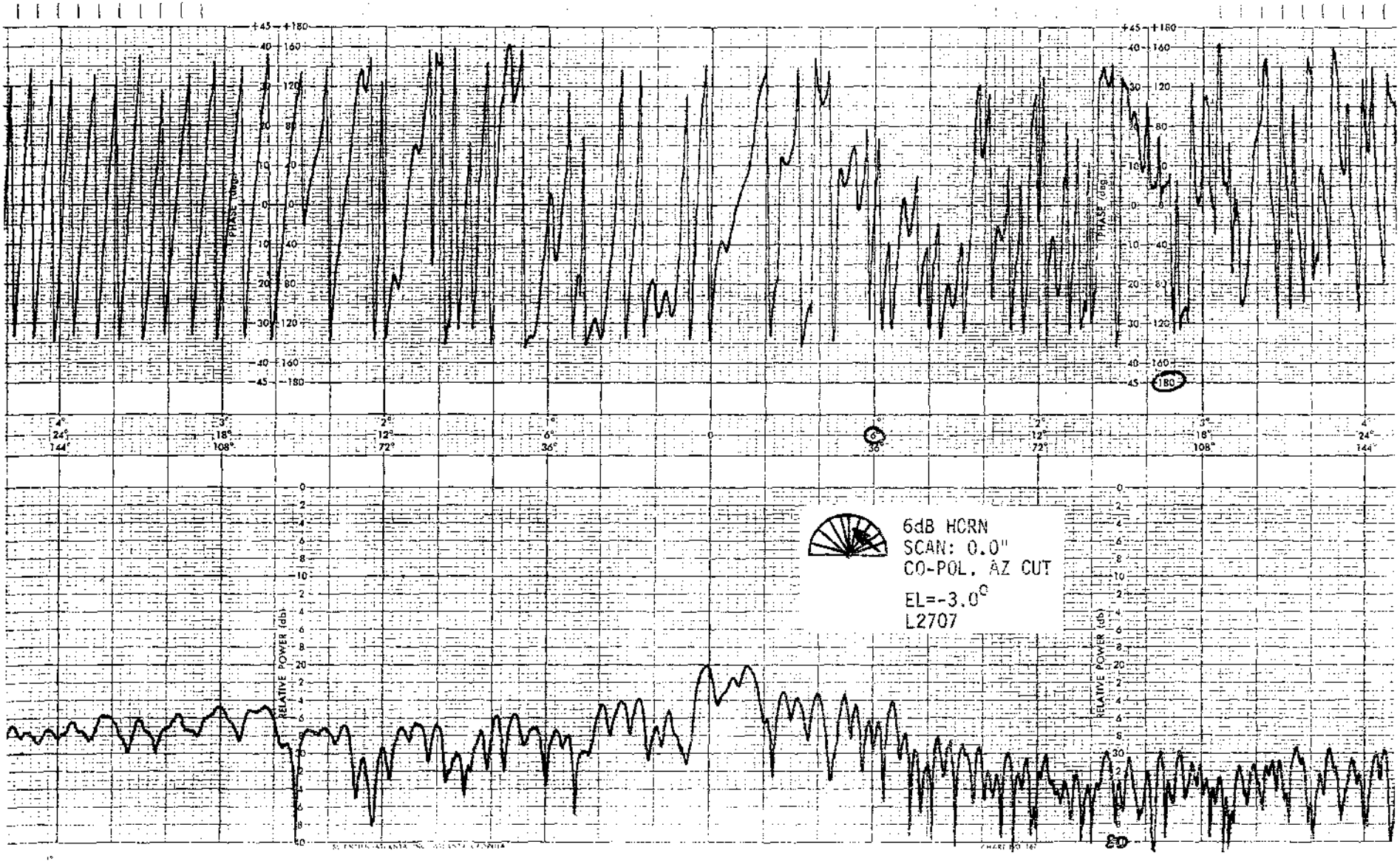

6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=+2.0°
R2702
PHASE (deg)
RELATIVE POWER (db)

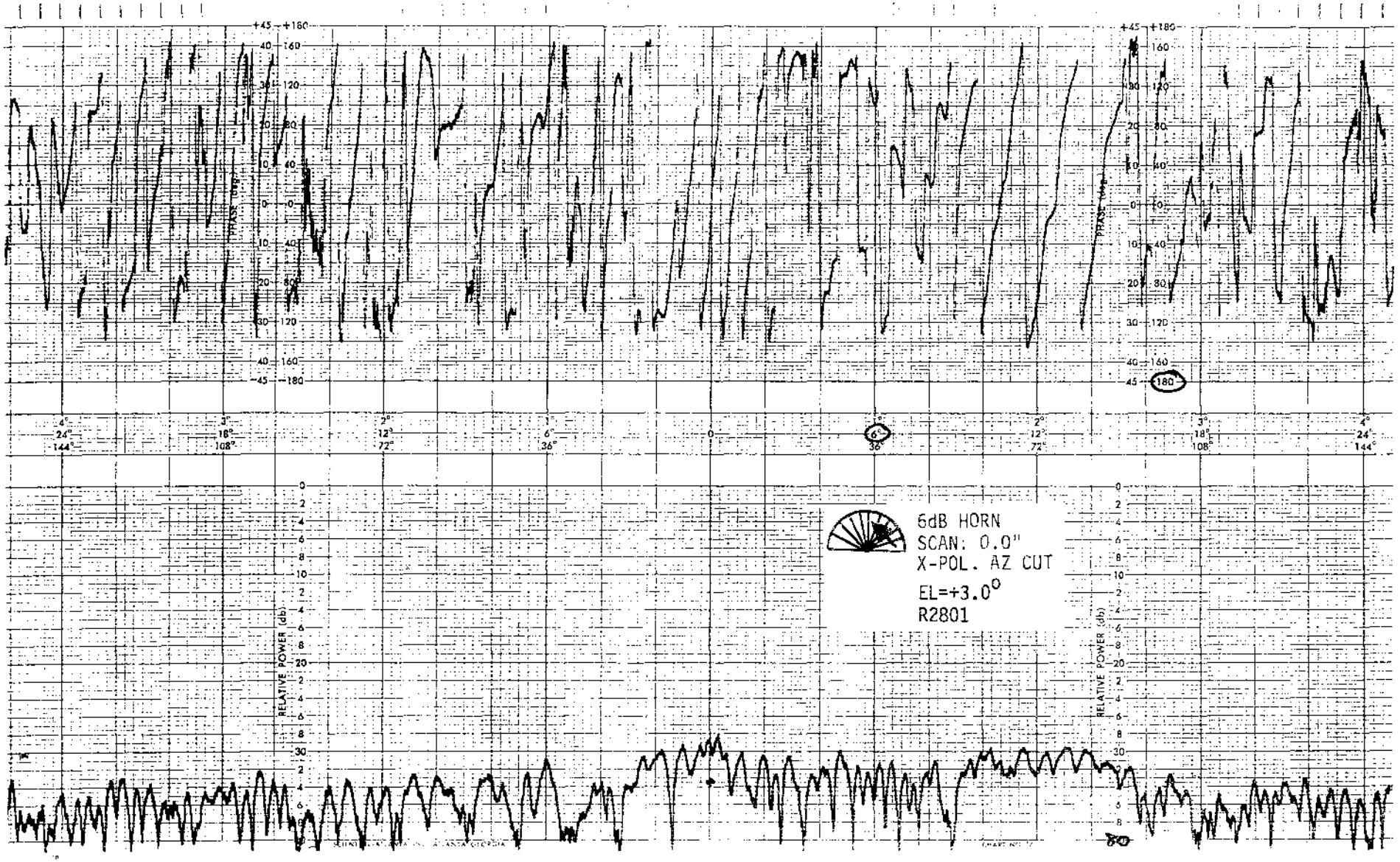

6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=+1.0°
R2703
PHASE (deg)
RELATIVE POWER (db)
SCIENTIFIC ATLANTA INC ATLANTA, GEORGIA
CHART NO. 167

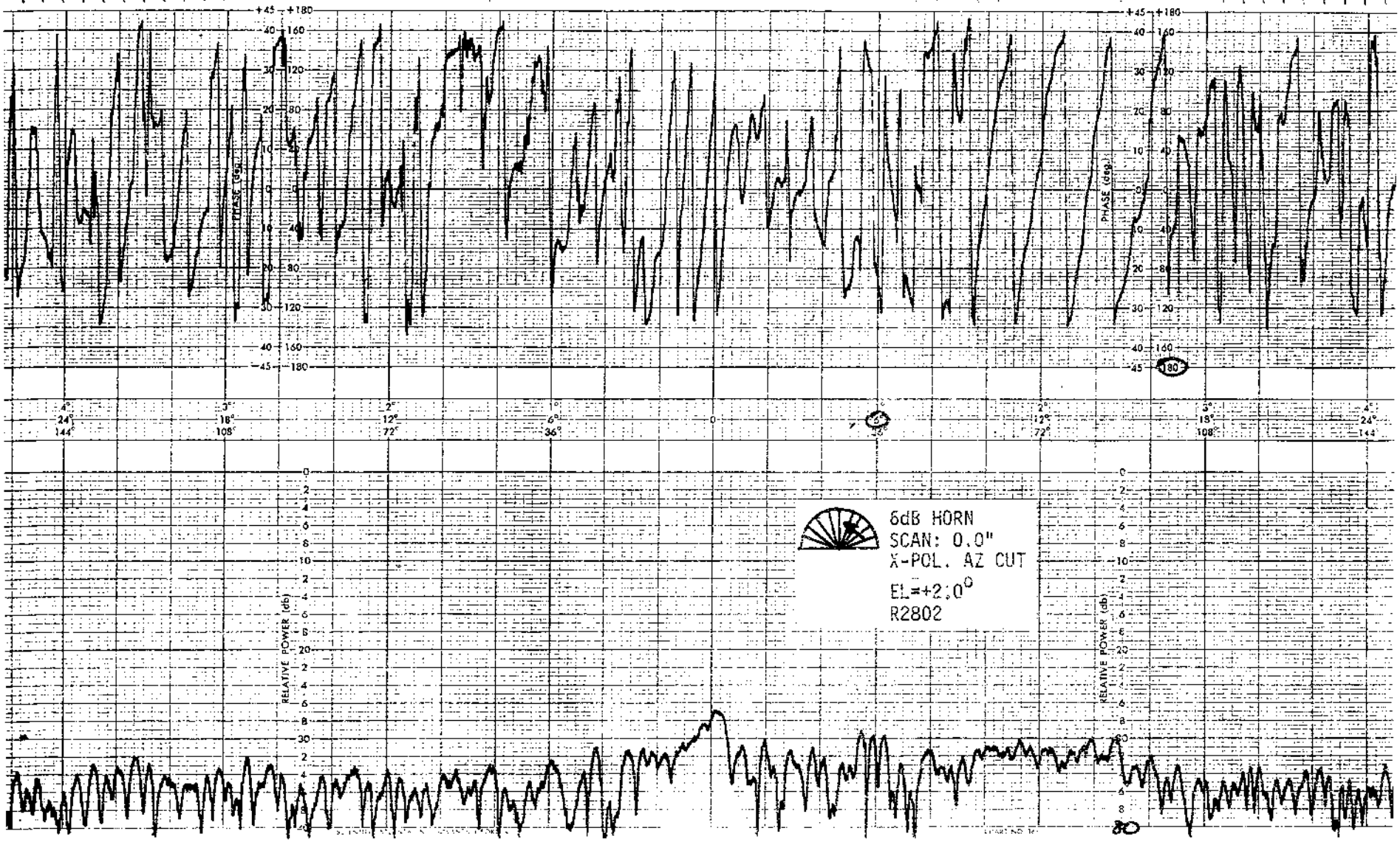

6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=0.0°
R2704
PHASE (deg.)
RELATIVE POWER (dB)

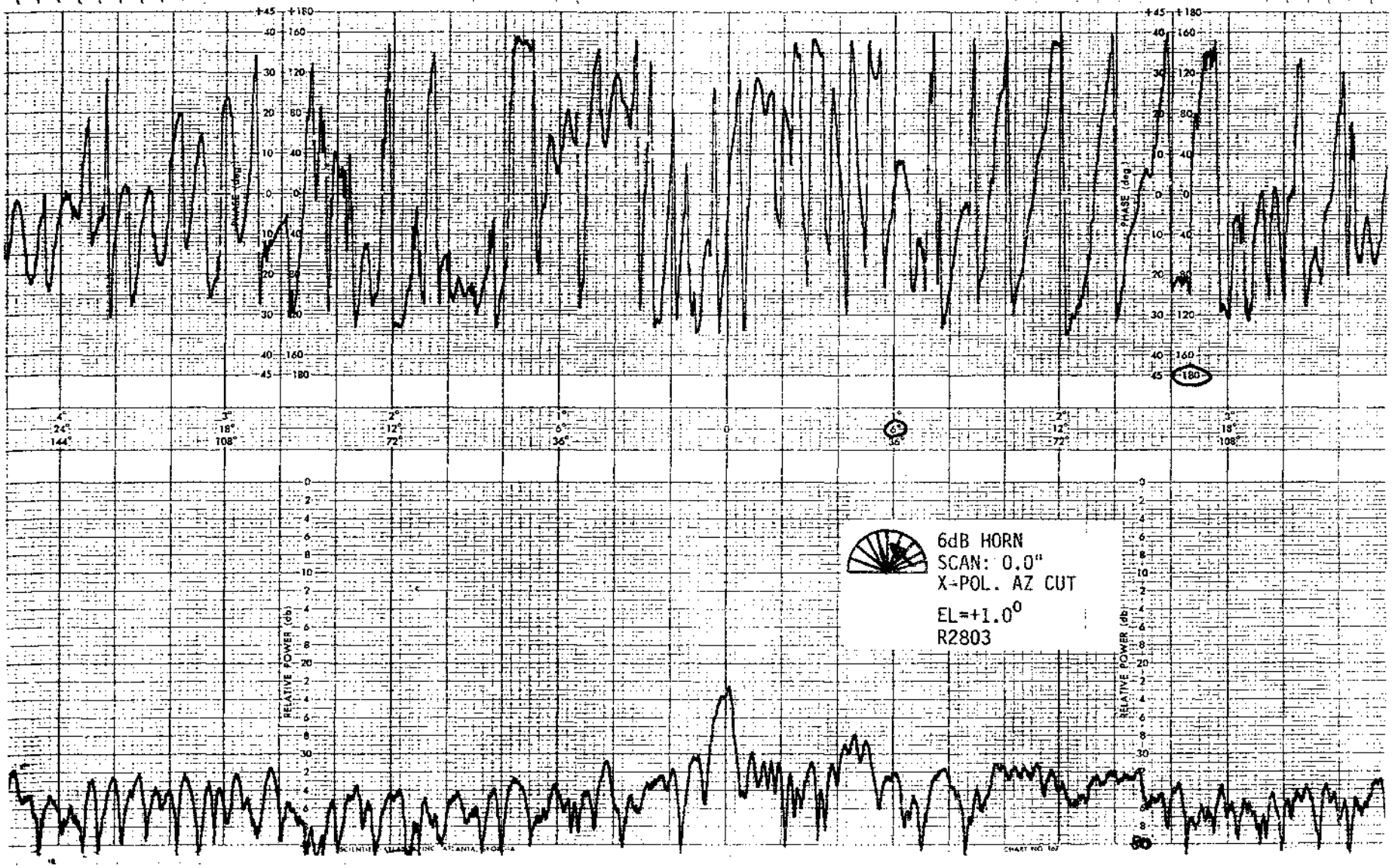

6dB HORN
SCAN: 0.0°
CO-POL. AZ CUT
EL=-1.0°
R2705
PHASE (deg)
RELATIVE POWER (db)

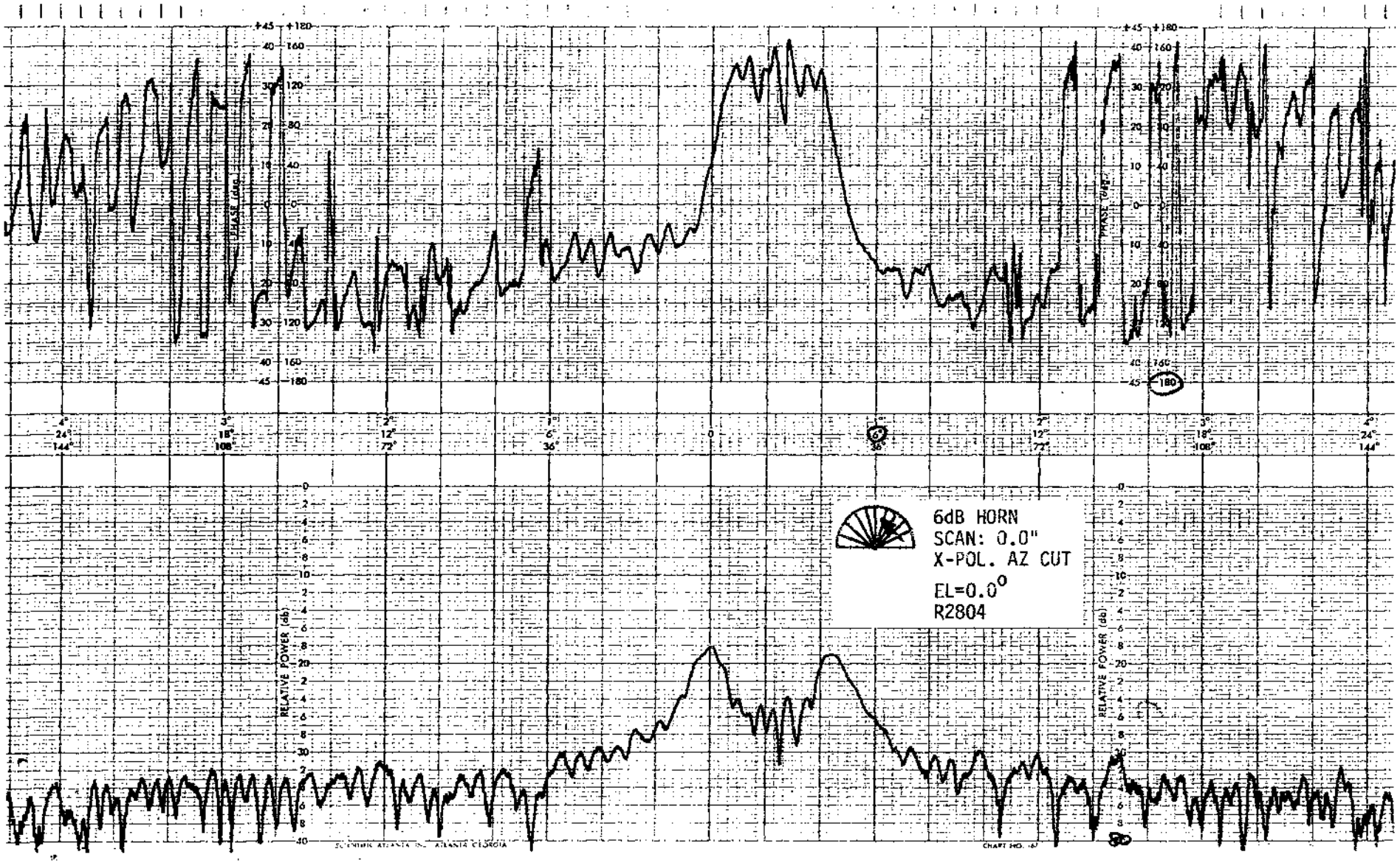

PHASE (deg)
RELATIVE POWER (dB)
6dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=-2.0°
R2706

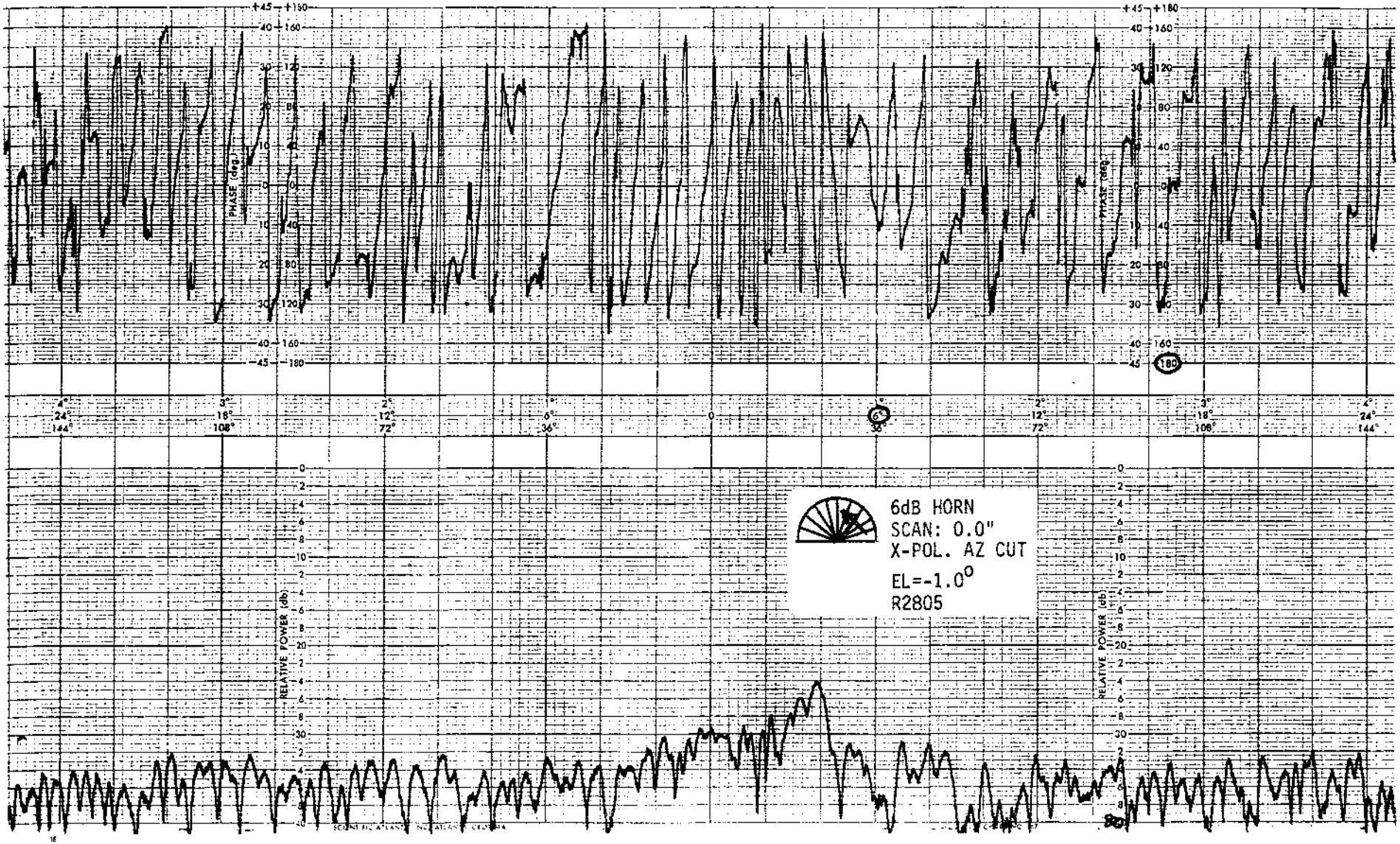

6dB HORN
SCAN: 0.0°
CO-POL, AZ CUT
EL=-3.0°
L2707
RELATIVE POWER (db)
PHASE (deg)

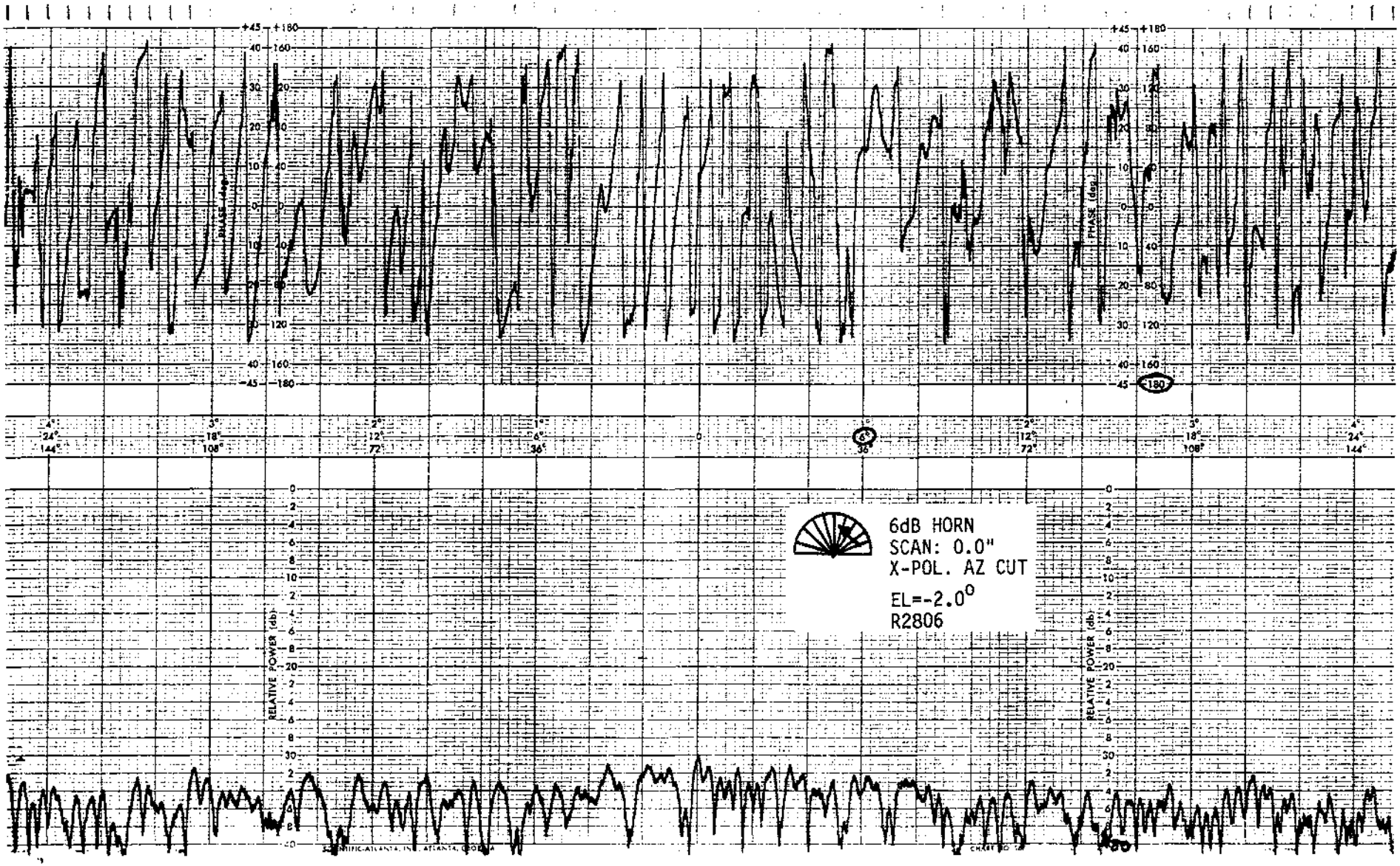

6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=+3.0°
R2801
RELATIVE POWER (db)

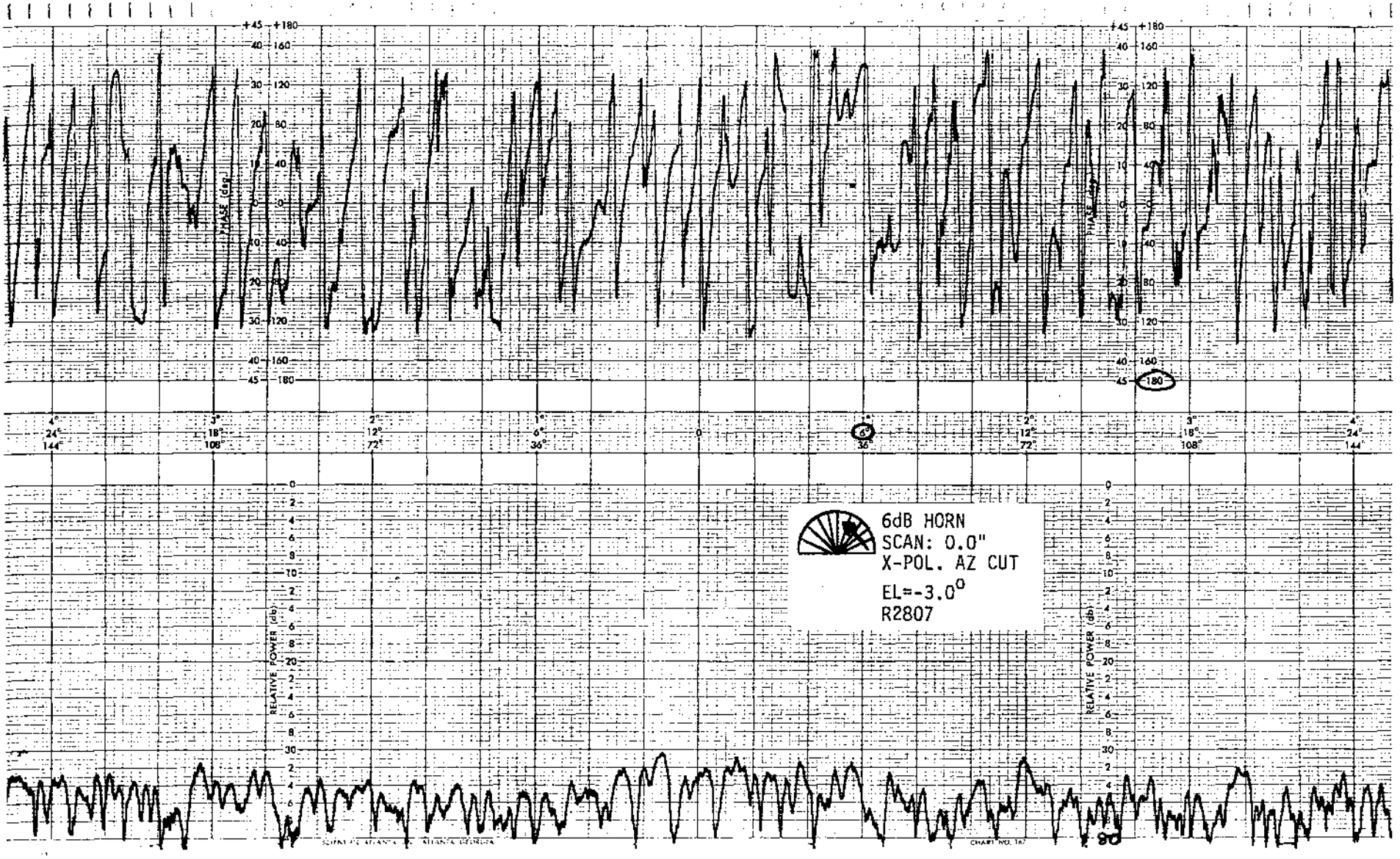

6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=+2.0°
R2802
PHASE (deg)
RELATIVE POWER (db)


6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=+1.0°
R2803
PHASE (deg.)
RELATIVE POWER (db)


6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=0.0°
R2804
PHASE (deg)
RELATIVE POWER (db)

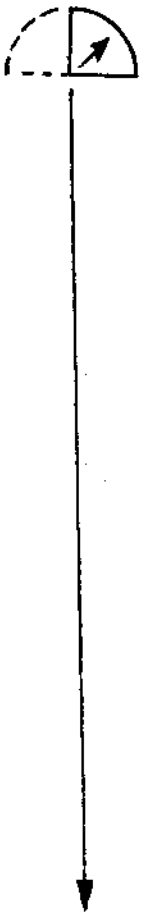

6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=-1.0°
R2805
PHASE (deg)
RELATIVE POWER (db)

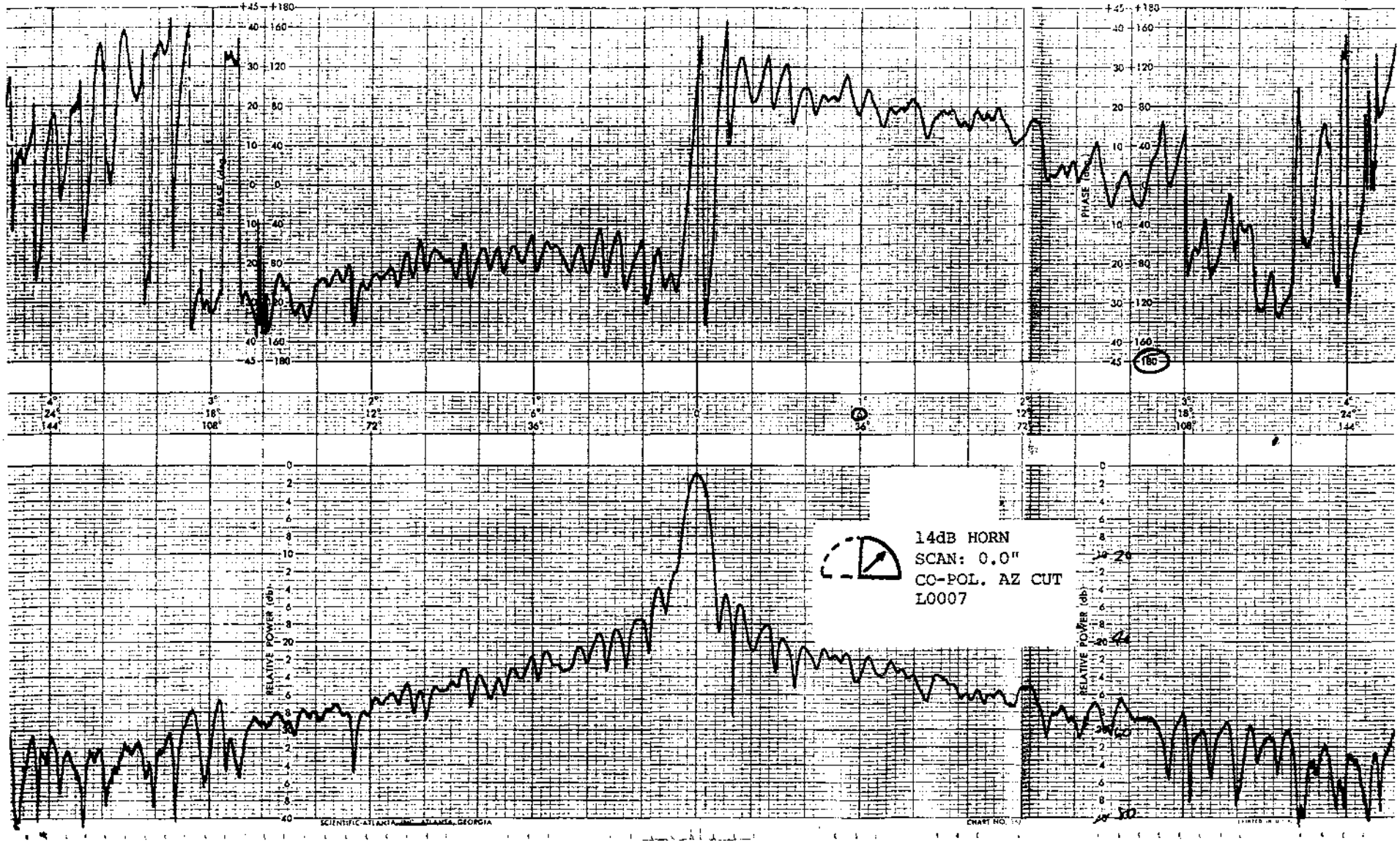

6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=-2.0°
R2806
PHASE (deg.)
RELATIVE POWER (db)

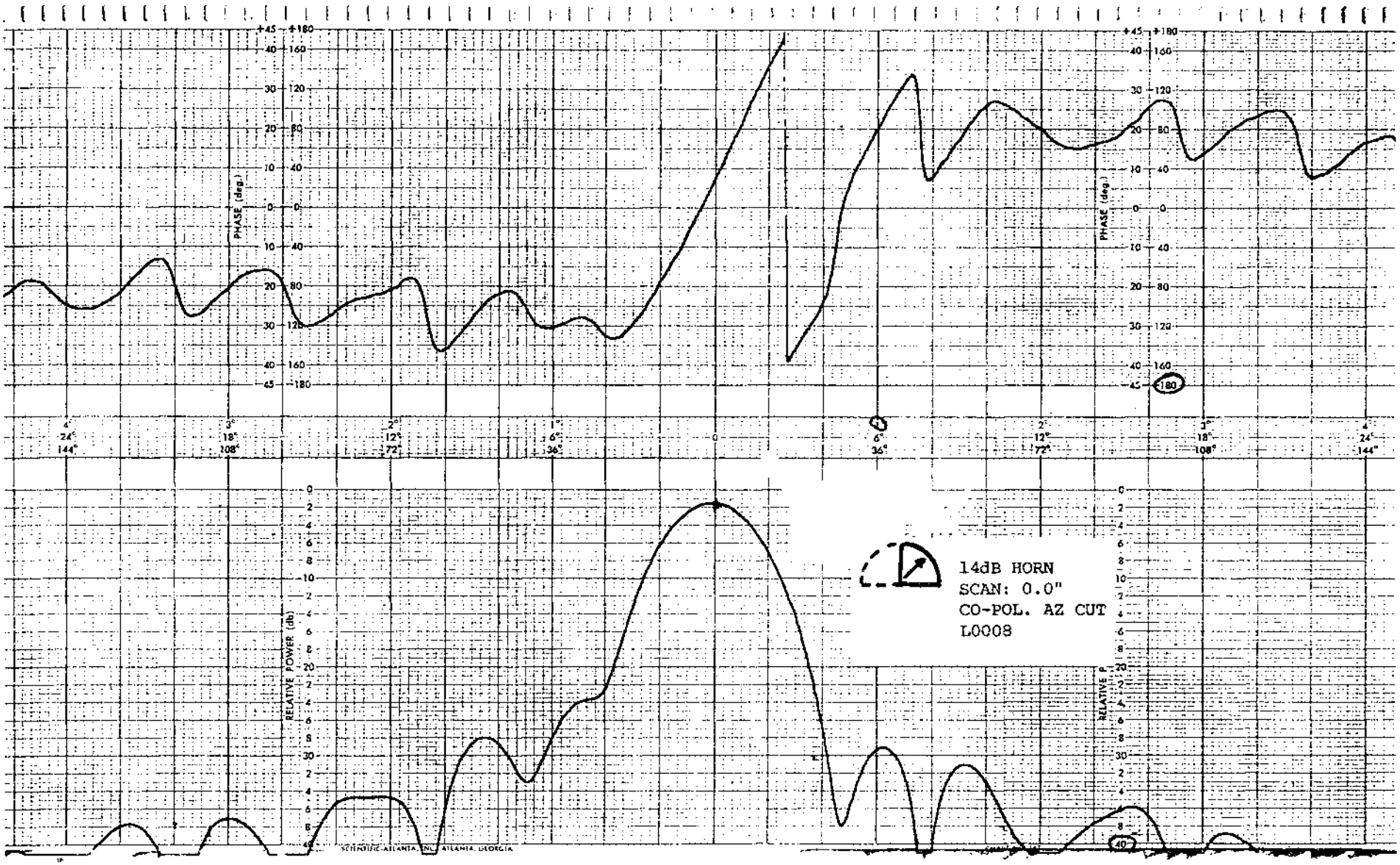

6dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=-3.0°
R2807
PHASE (deg)
RELATIVE POWER (db)

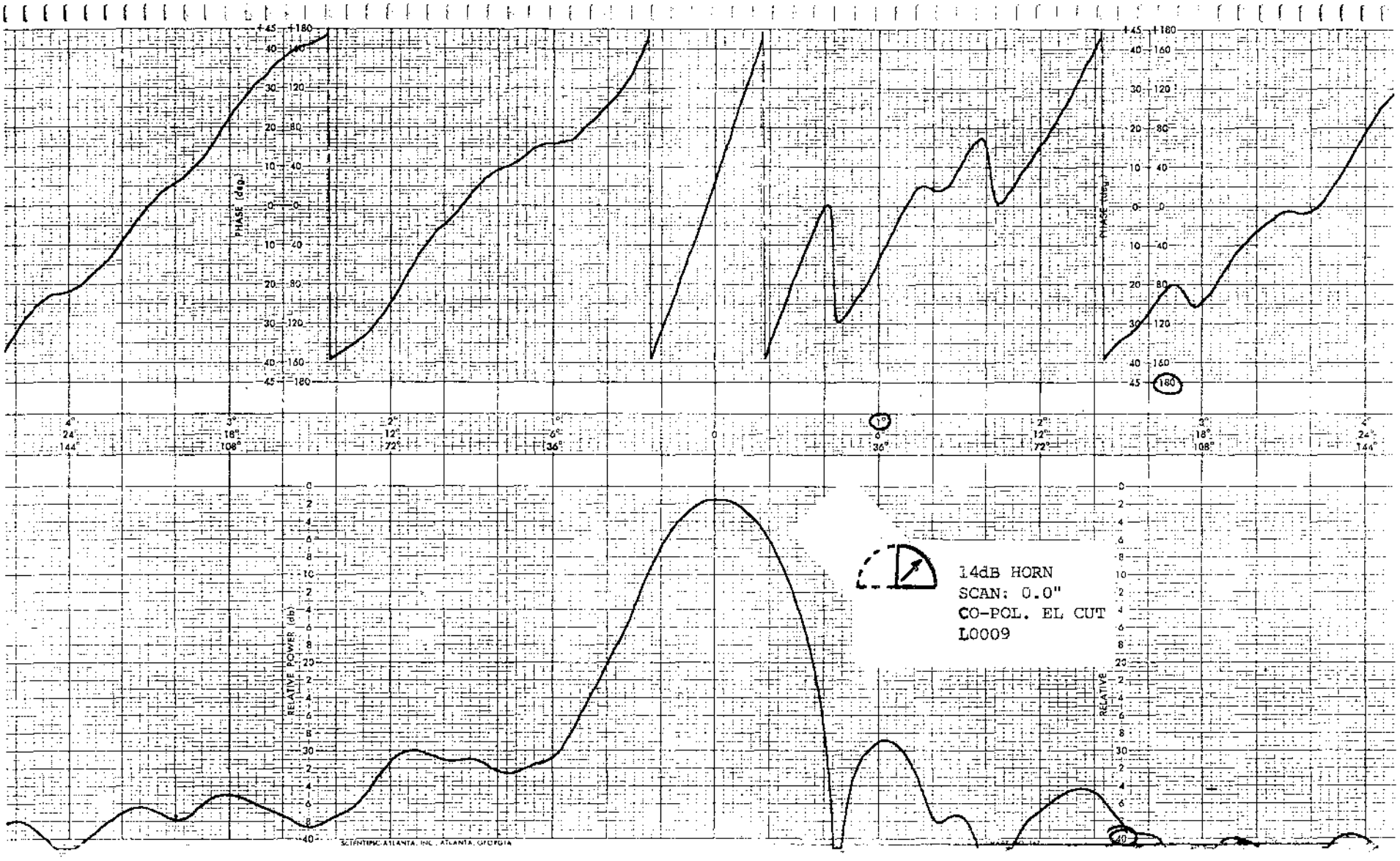
LSST - VII

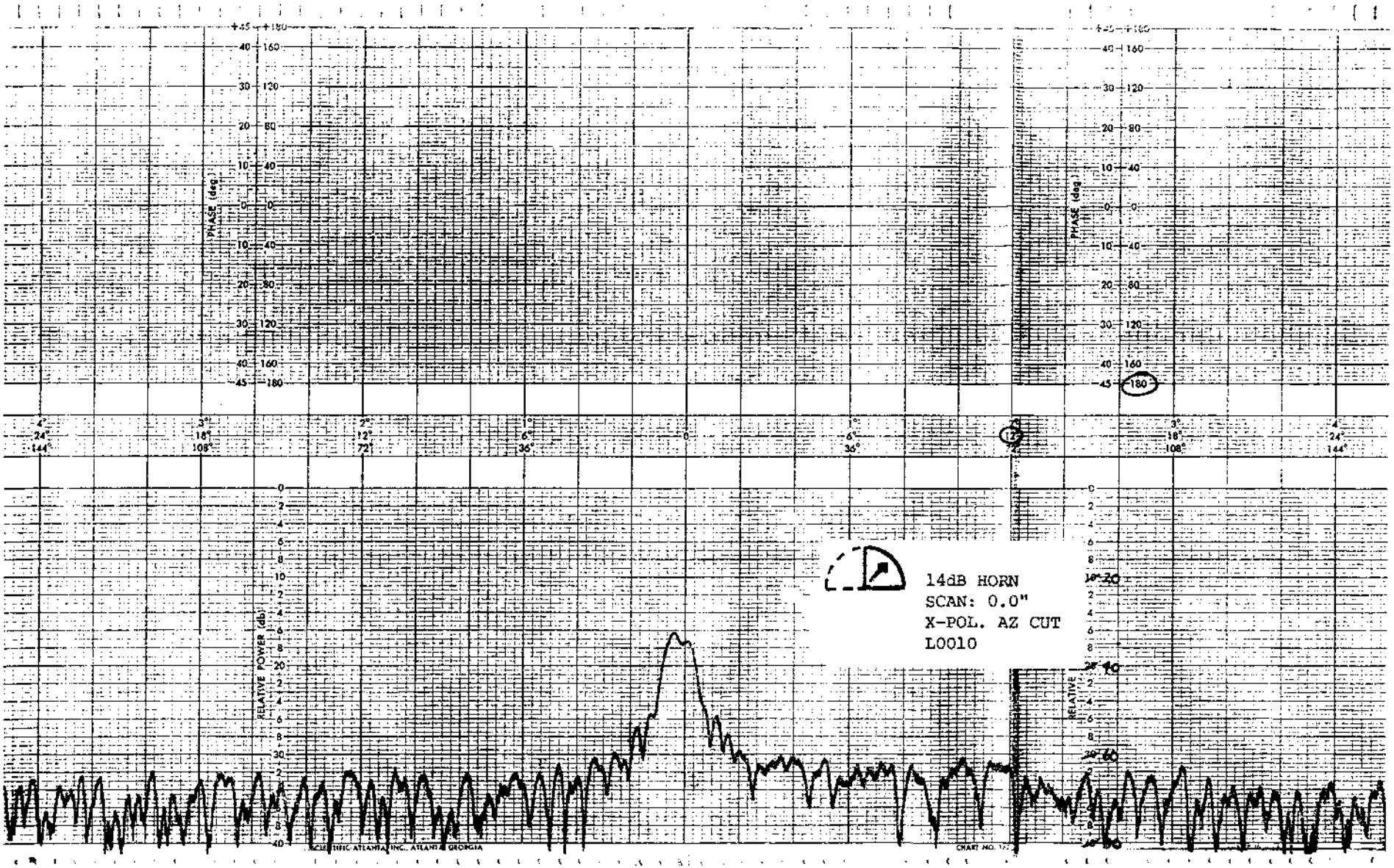
SECONDARY PATTERN LOG

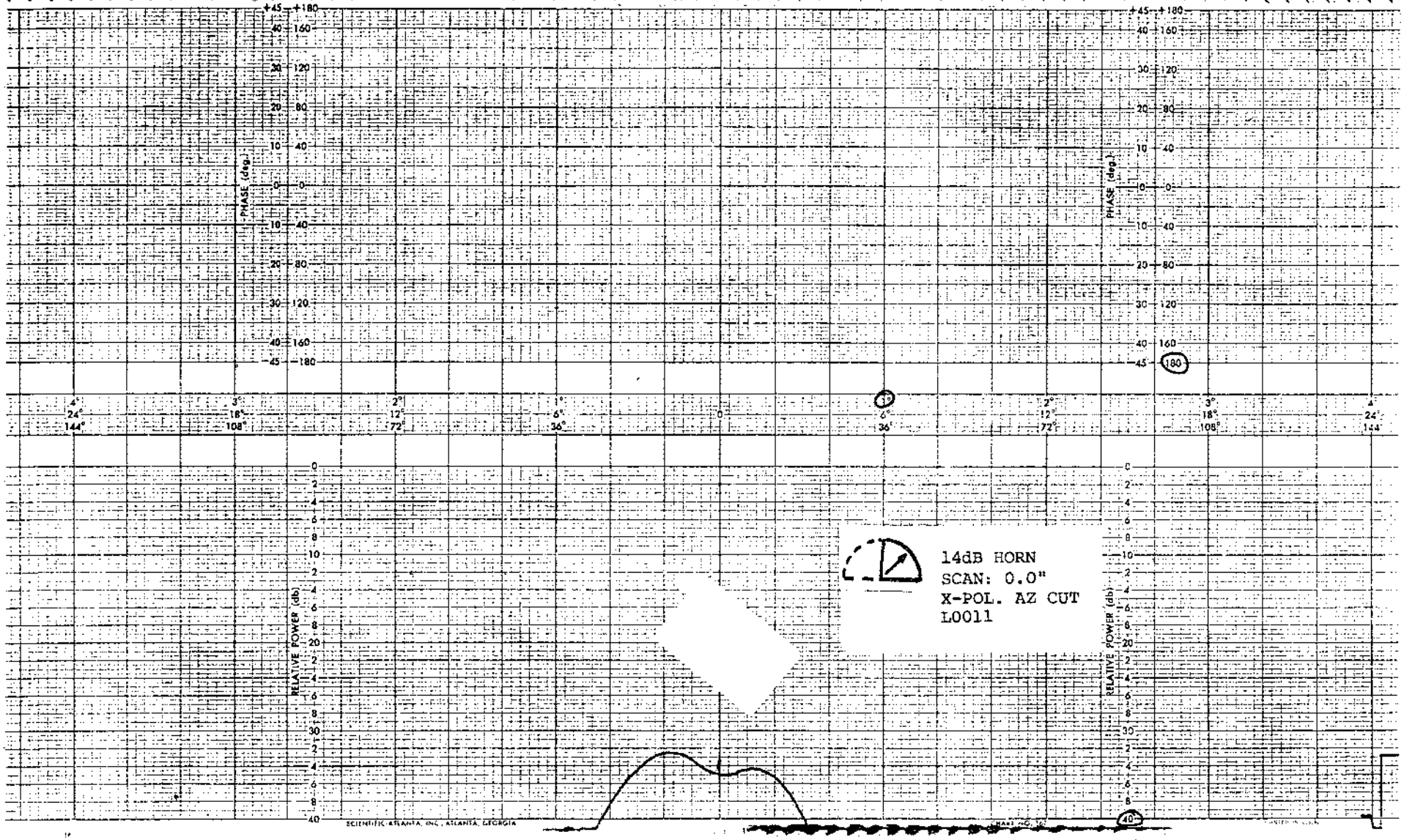
CONFIGURATION	HORN	SCAN	POL.	PK. GAIN	PATTERN	FILE NAME	PAGE NUMBER
	14 dB	0.0"	CO	50.52	± 45° AZ	L0007	215
	"	"	CO	"	± 5° AZ	L0008	216
	"	"	CO	"	± 5° EL	L0009	217
	"	"	X	-	± 45° AZ	L0010	218
	"	"	X	-	± 5° AZ	L0011	219
	"	"	X	-	± 5° EL	L0012	220
	14 dB	4.5"	CO	50.35	± 45° AZ	L0017	221
	"	"	CO	"	± 5° AZ	L0015	222
	"	"	CO	"	± 5° EL	L0016	223
	"	"	X	-	± 45° AZ	L0020	224
	"	"	X	-	± 5° AZ	L0018	225
	"	"	X	-	± 5° EL	L0019	226
	14 dB	6.5"	CO	50.05	± 45° AZ	AAN45	227
	"	"	CO	"	± 5° AZ	AANC1	228
	"	"	CO	"	± 5° EL	EANC1	229
	"	"	X	-	± 45° AZ	AXPSC	230
	"	"	X	-	± 5° AZ	AZPSC	231
	"	"	X	-	± 5° EL	EXPSC	232
	14 dB	0.0"	CO	32.15	± 45° AZ	L0068	233
	"	"	CO	"	± 5° AZ	L0067	234
	"	"	CO	"	± 5° EL	L0069	235
	"	"	X	-	± 45° AZ	L0072	236
	"	"	X	-	± 5° AZ	L0071	237
	"	"	X	-	± 5° EL	L0070	238
	14 dB	0.0"	CO	35.05	± 45° AZ	L0063	239
	"	"	CO	"	± 5° AZ	L0061	240
	"	"	CO	"	± 5° EL	L0062	241
	"	"	X	-	± 45° AZ	L0066	242
	"	"	X	-	± 5° AZ	L0065	243
	"	"	X	-	± 5° EL	L0064	244

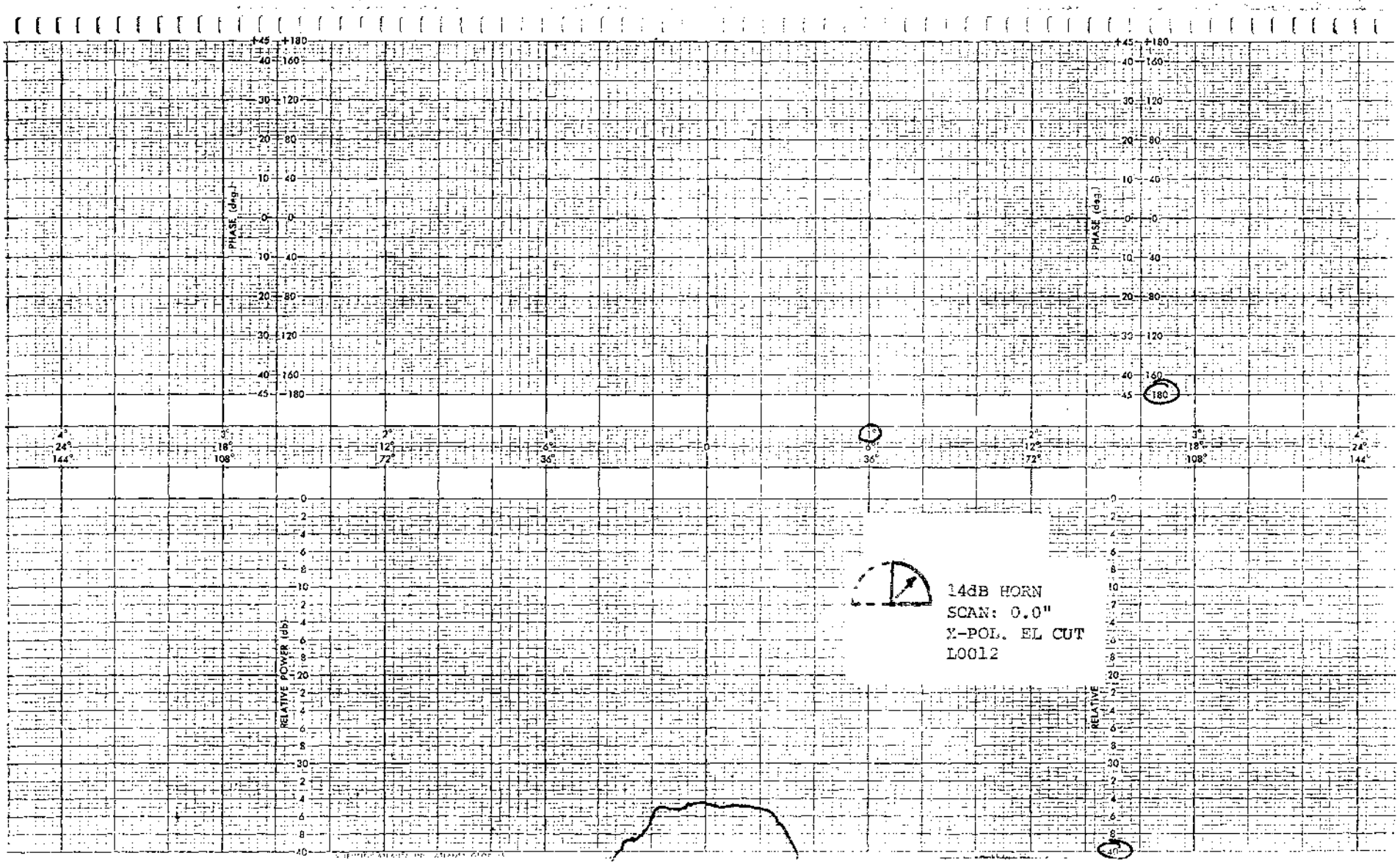

14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
L0007
PHASE (deg)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

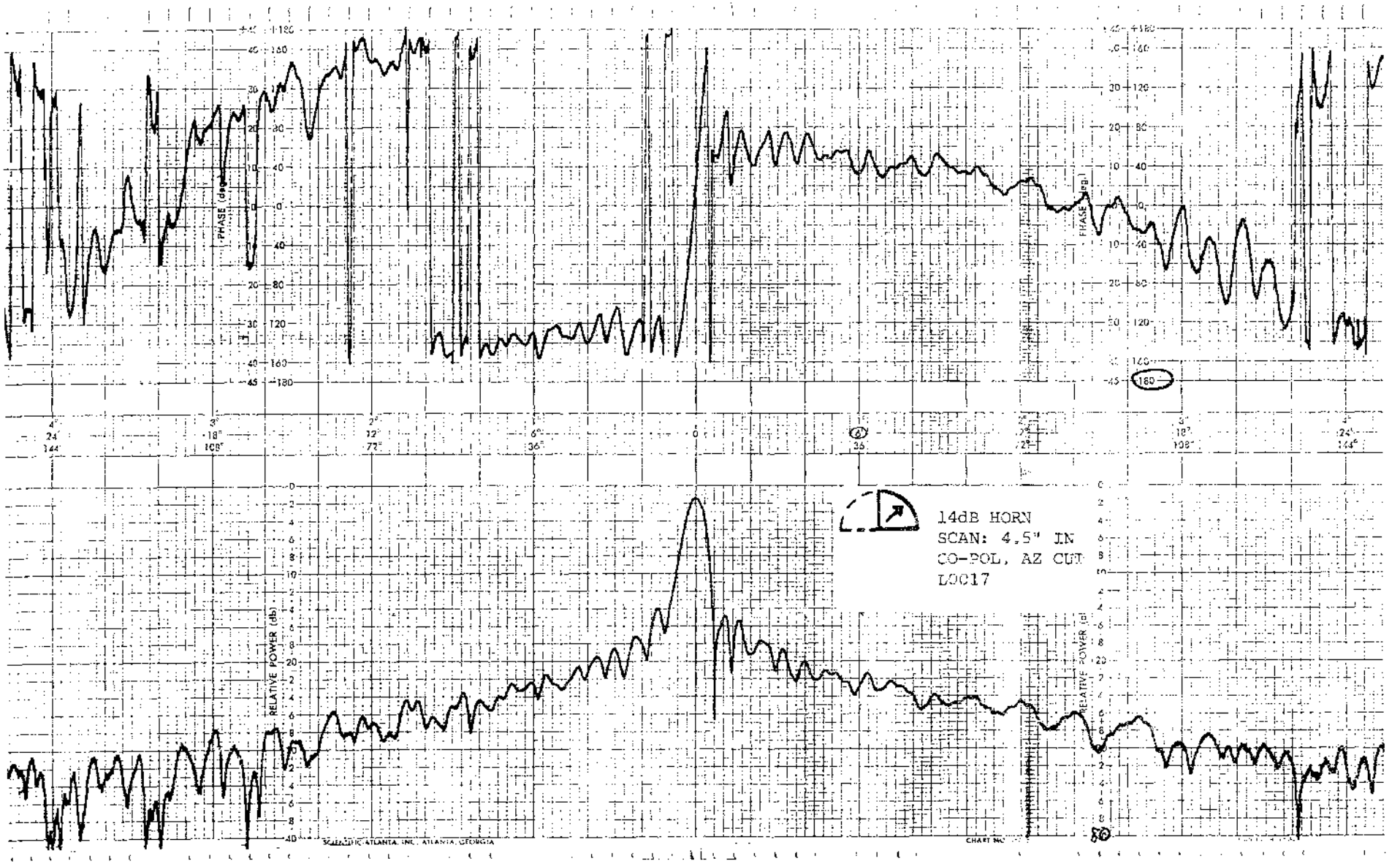

PHASE (deg.)
RELATIVE POWER (db)
14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
L0008
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

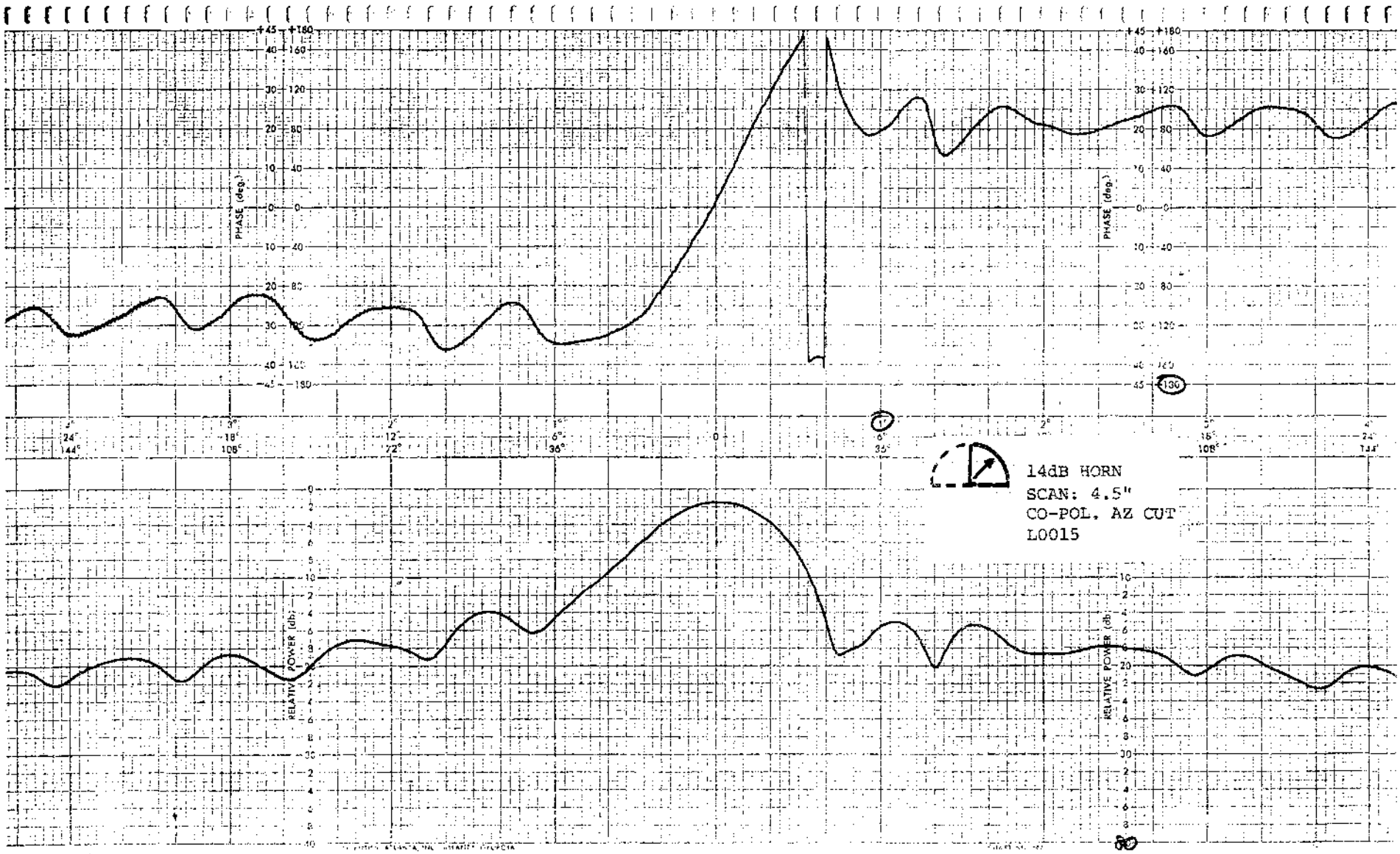

PHASE (deg.)
PHASE (deg.)
RELATIVE POWER (db)
RELATIVE
14dB HORN
SCAN: 0.0"
CO-POL. EL CUT
L0009
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

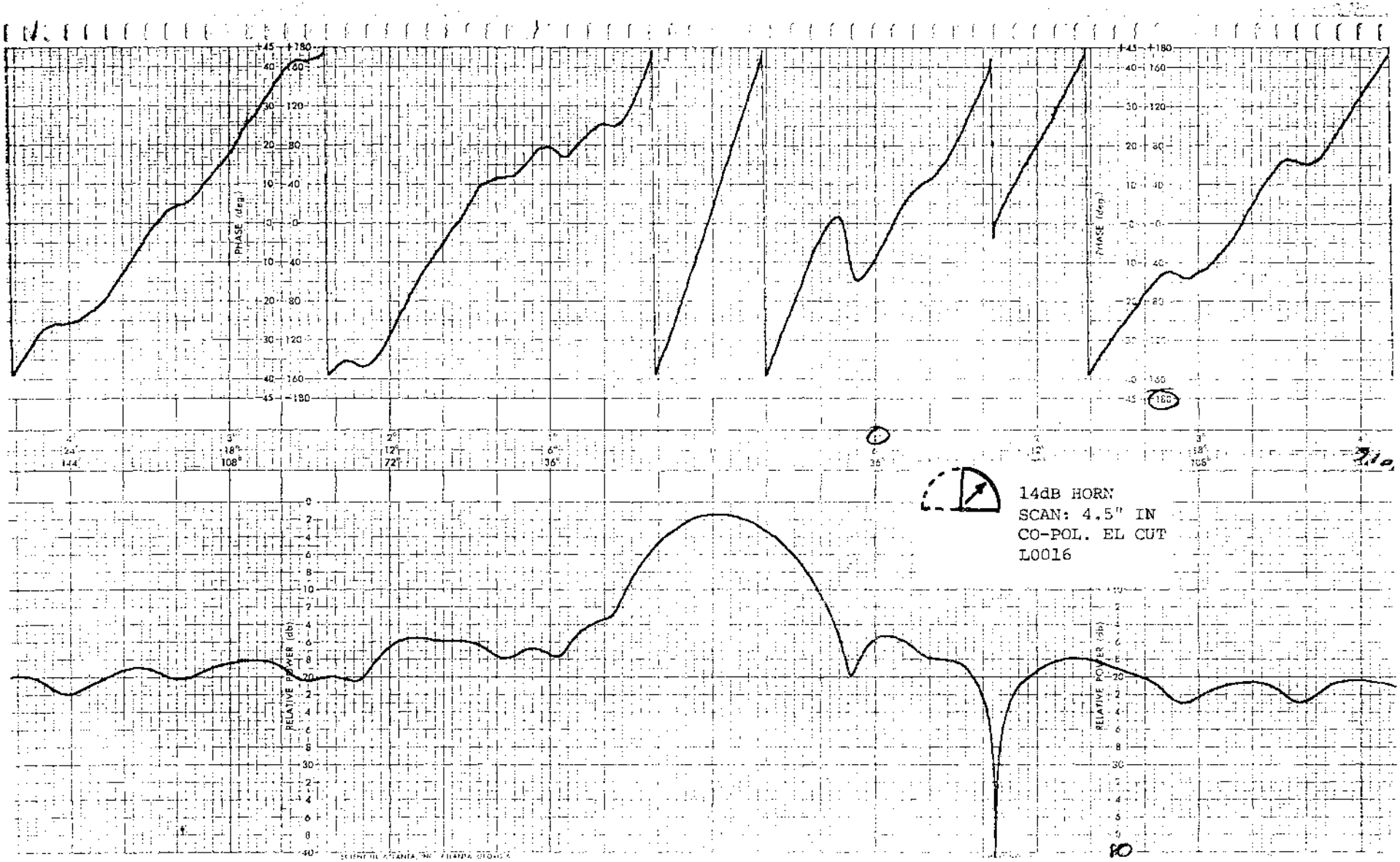

14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
L0010
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

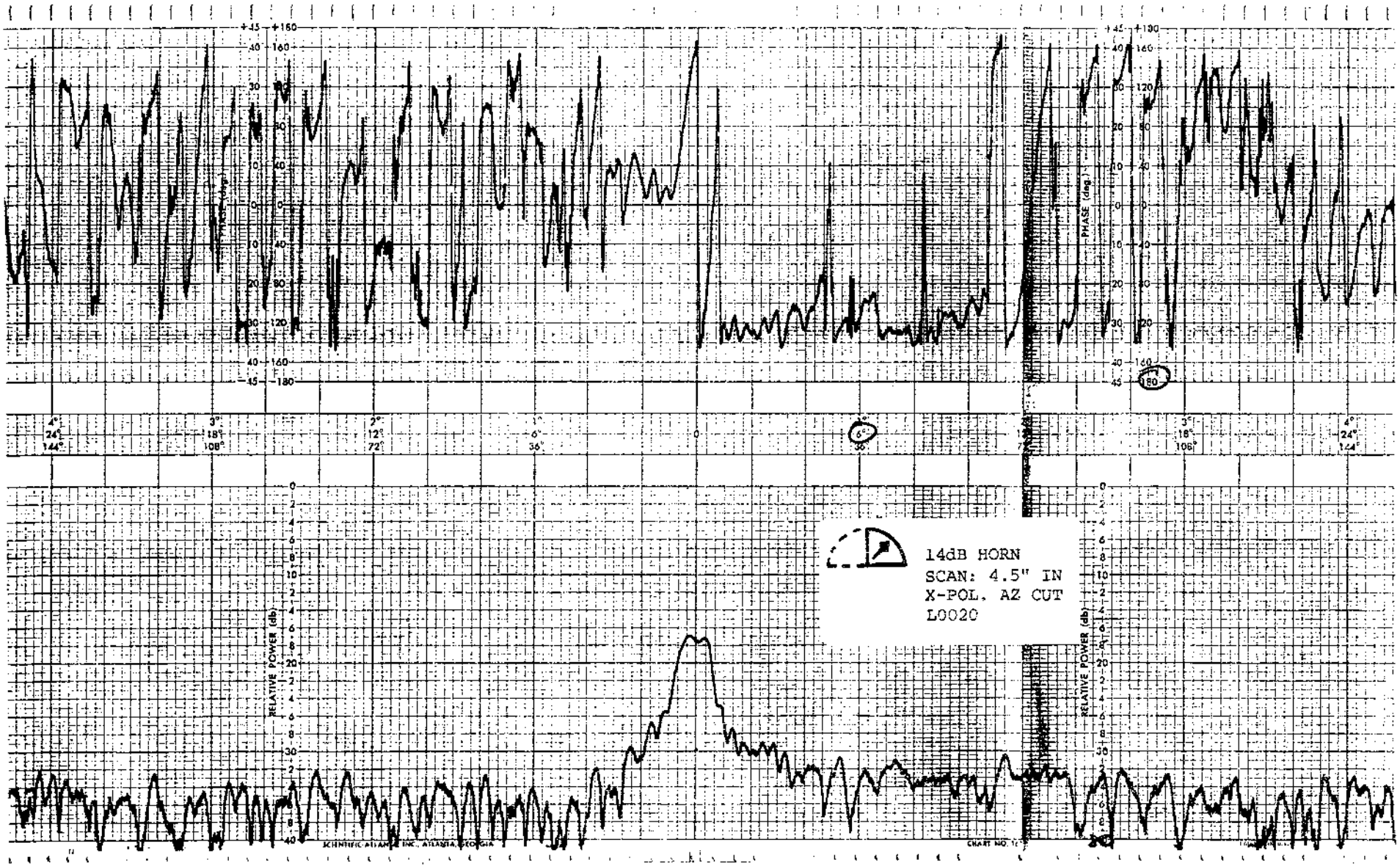

14dB HORN
SCAN: 0.0°
X-POL. AZ CUT
L0011
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

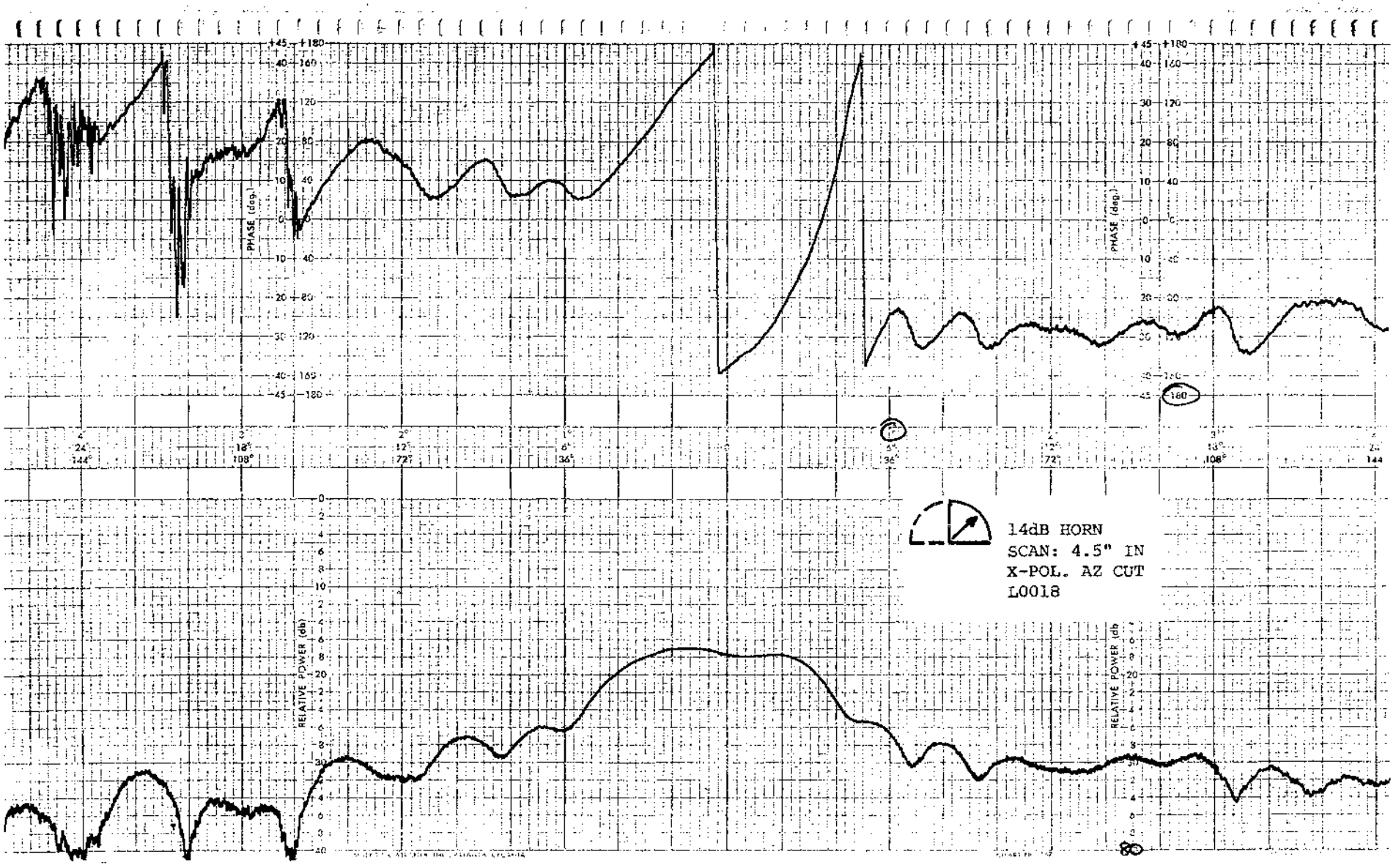

PHASE (deg.)
RELATIVE POWER (db)
14dB HORN
SCAN: 0.0"
X-POL. EL CUT
L0012

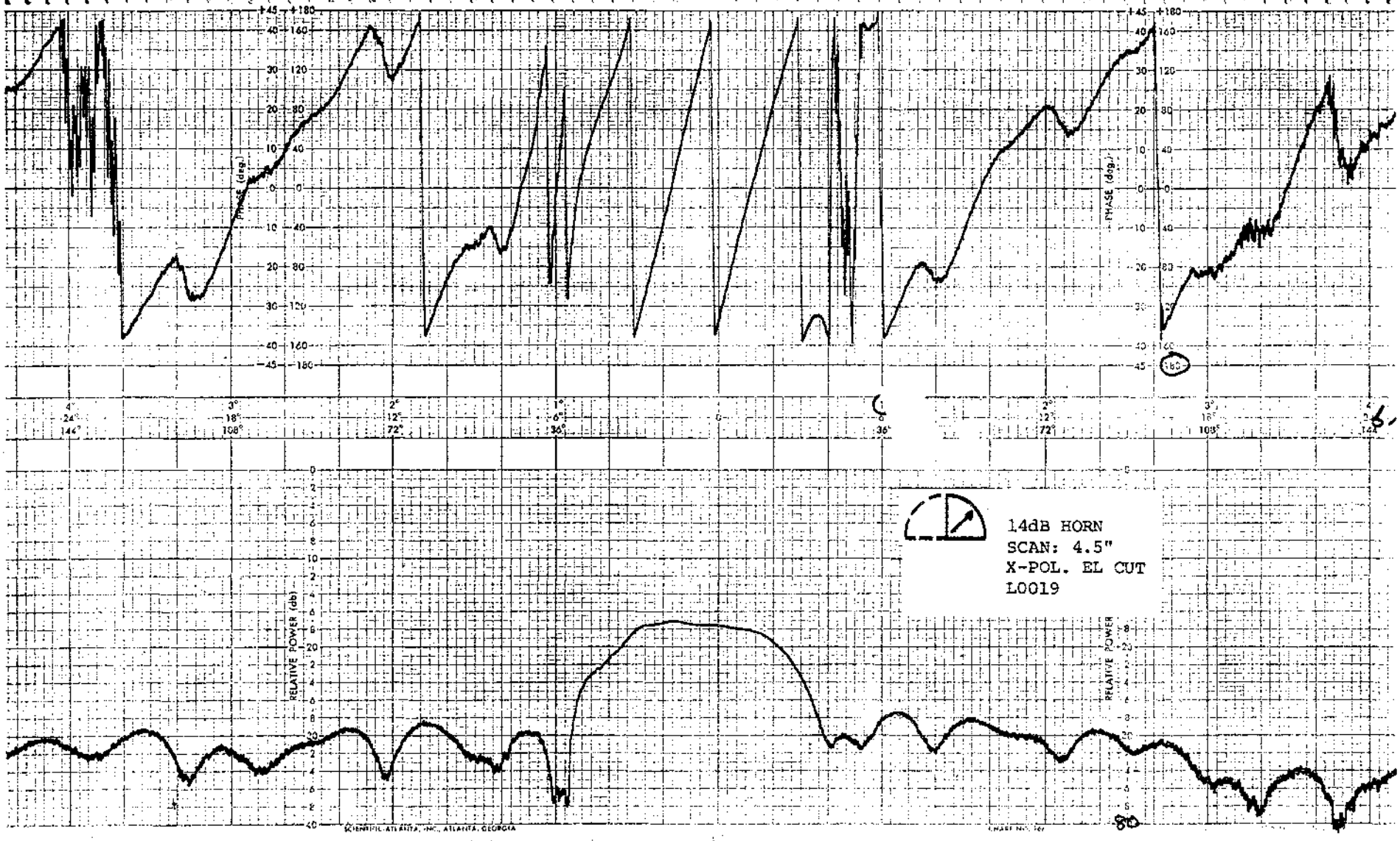

14dB HORN
SCAN: 4.5" IN
CO-POL, AZ CUT
L0017
PHASE (deg)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

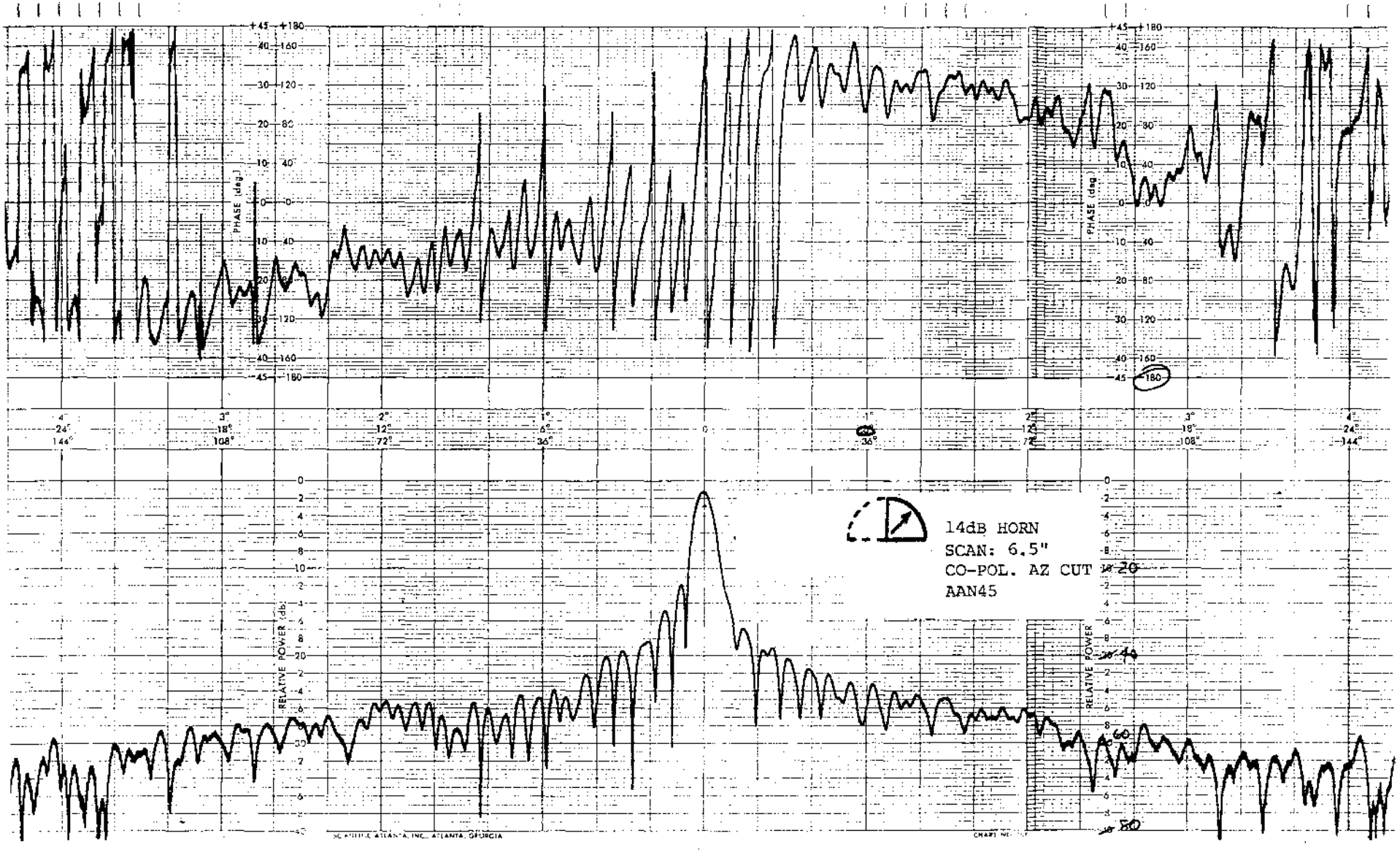

PHASE (deg.)
RELATIVE POWER (db)
14dB HORN
SCAN: 4.5"
CO-POL. AZ CUT
L0015

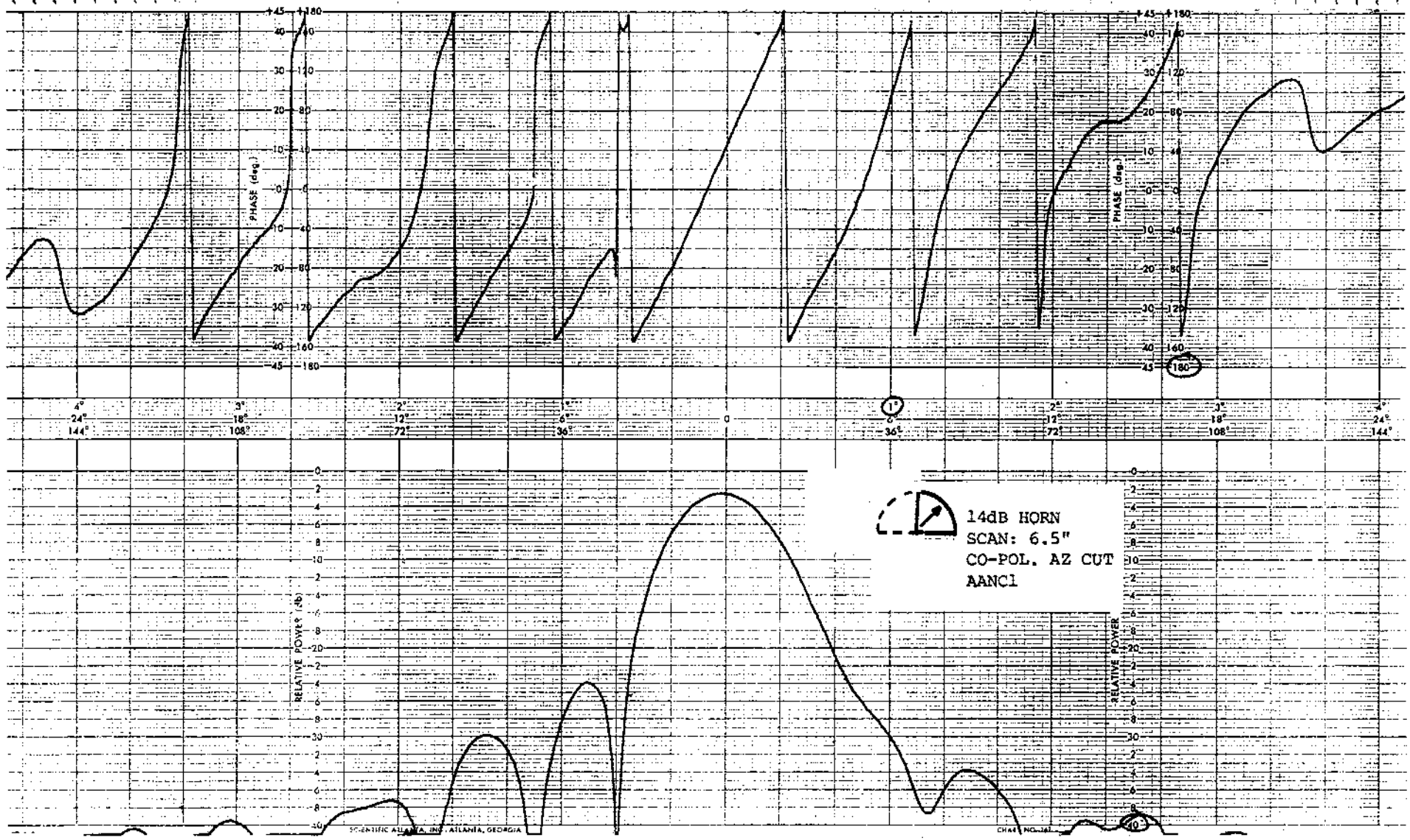

14dB HORN
SCAN: 4.5" IN
CO-POL. EL CUT
L0016
PHASE (deg.)
RELATIVE POWER (db)

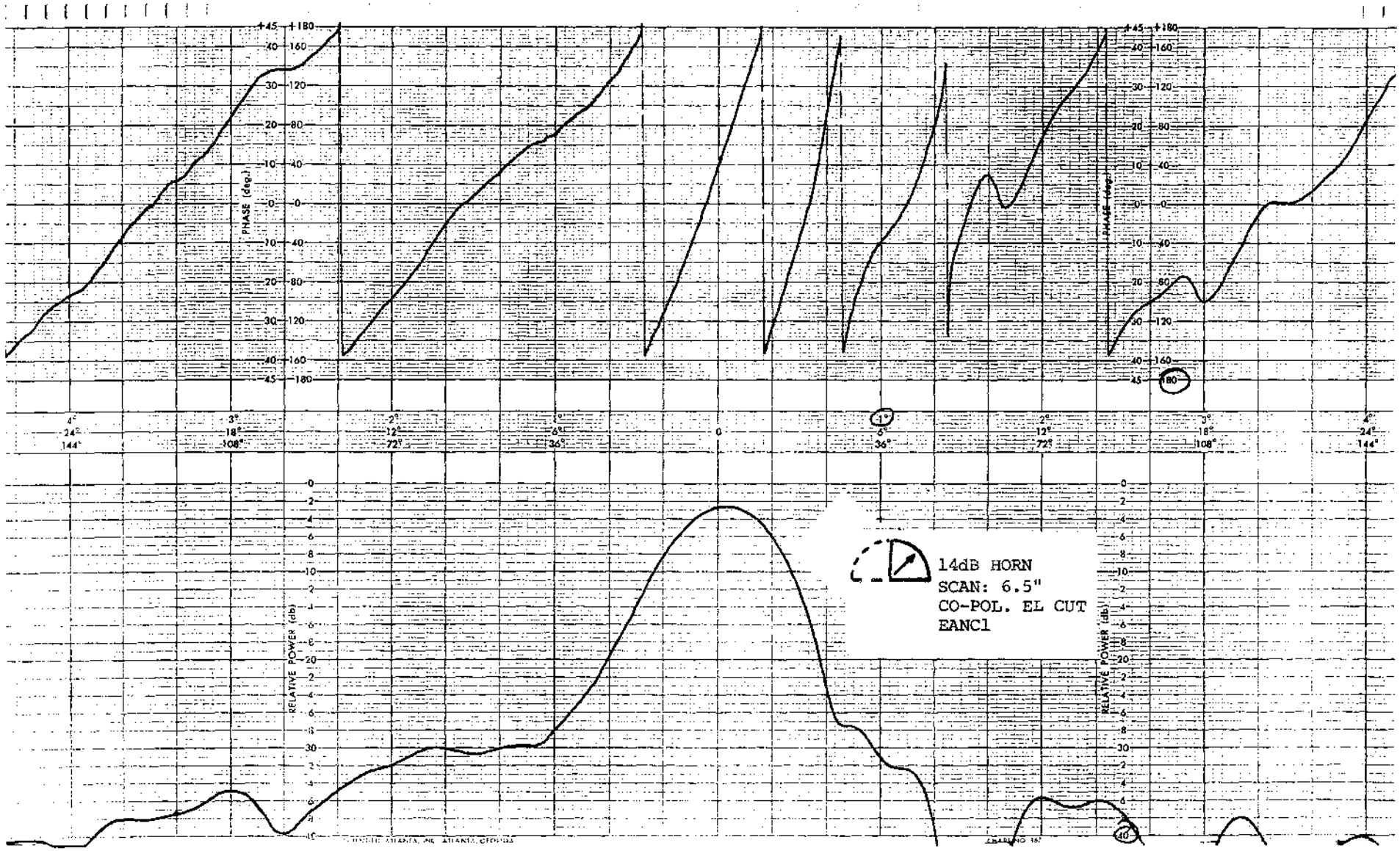

14dB HORN
SCAN: 4.5" IN
X-POL. AZ CUT
L0020
PHASE (deg)
RELATIVE POWER (db)

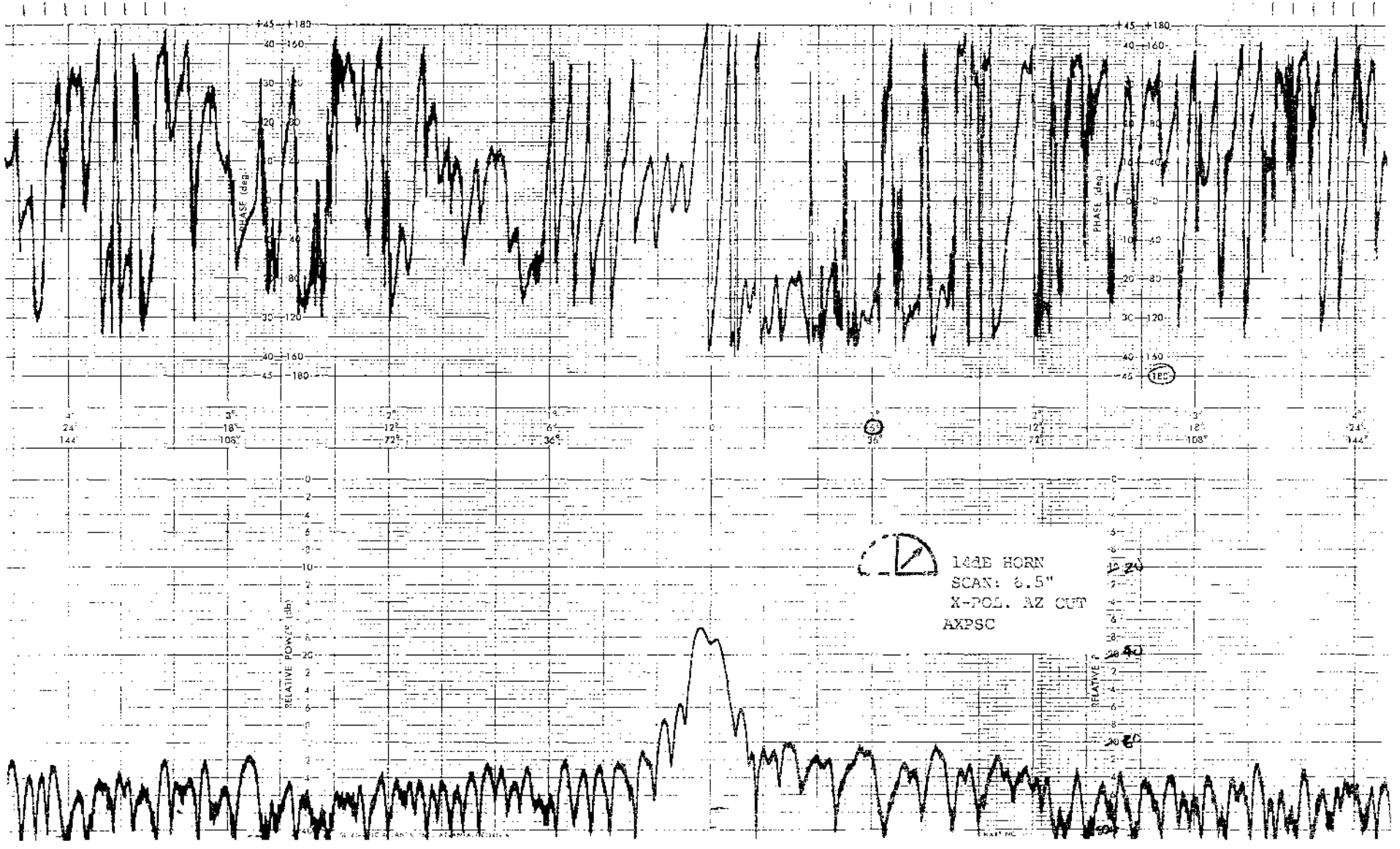

PHASE (deg.)
RELATIVE POWER (db)
14dB HORN
SCAN: 4.5" IN
X-POL. AZ CUT
L0018

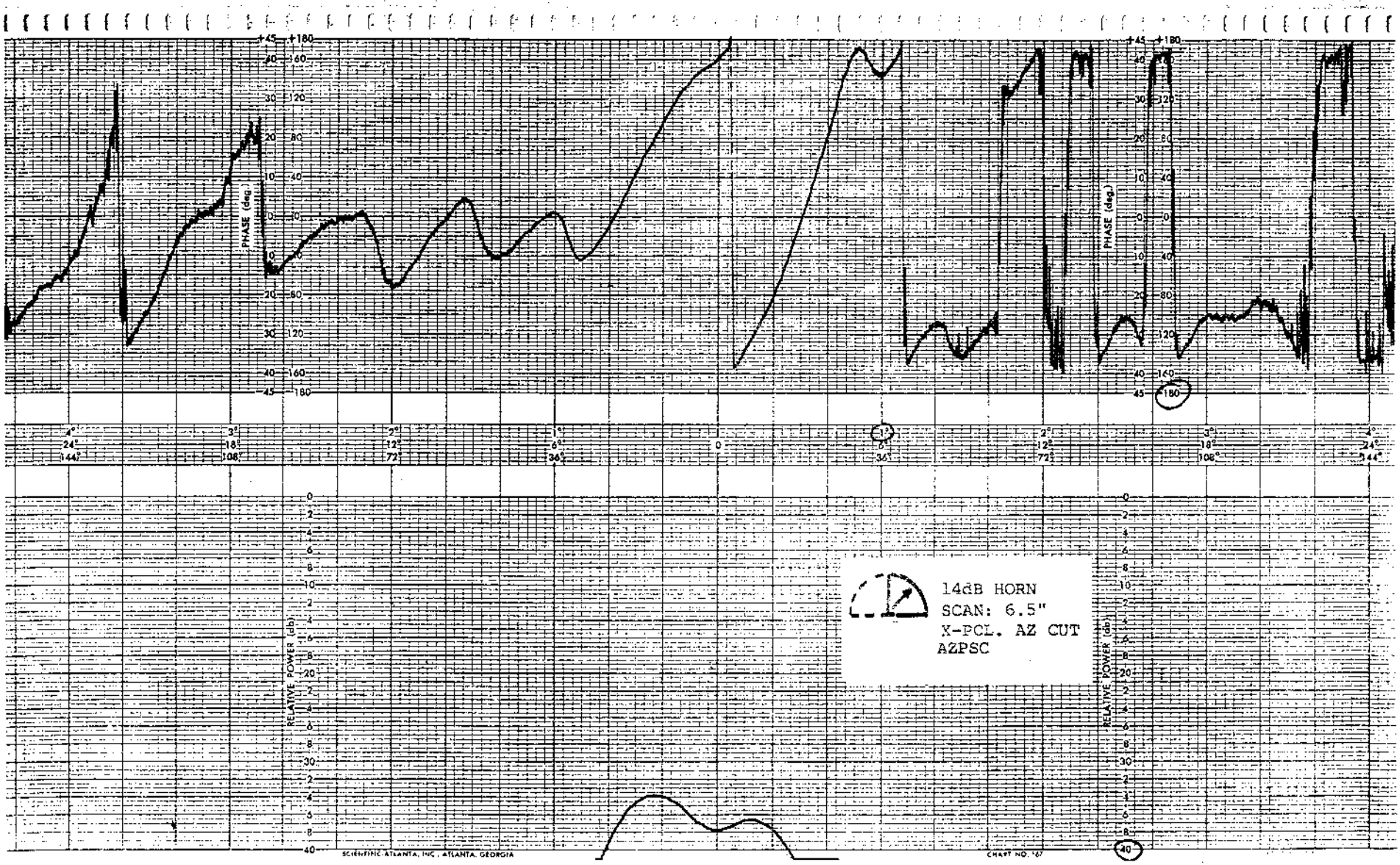

14dB HORN
SCAN: 4.5"
X-POL. EL CUT
L0019
PHASE (deg.)
RELATIVE POWER (db)

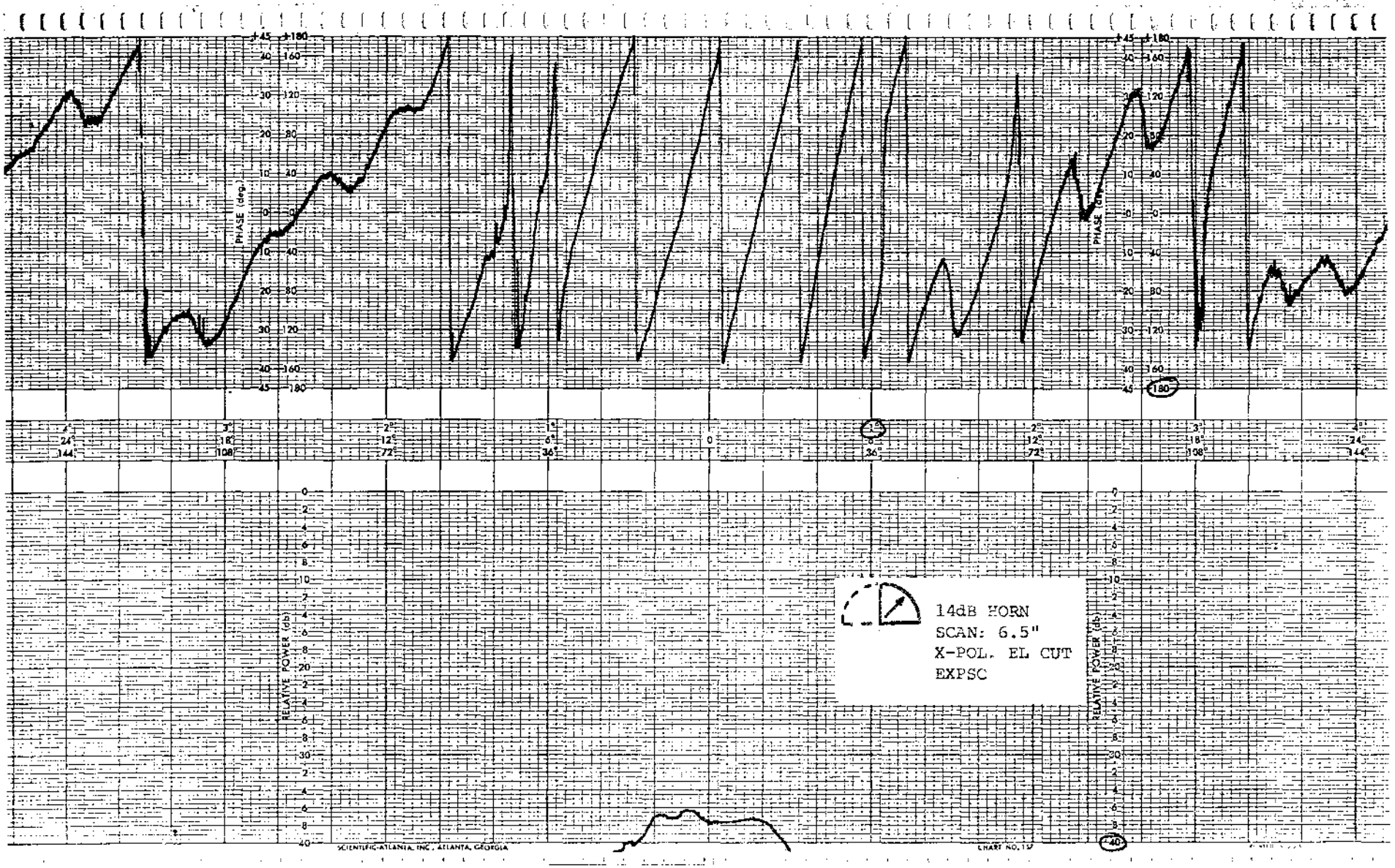

PHASE (deg.)
RELATIVE POWER (db)
14dB HORN
SCAN: 6.5"
CO-POL. AZ CUT
AAN45

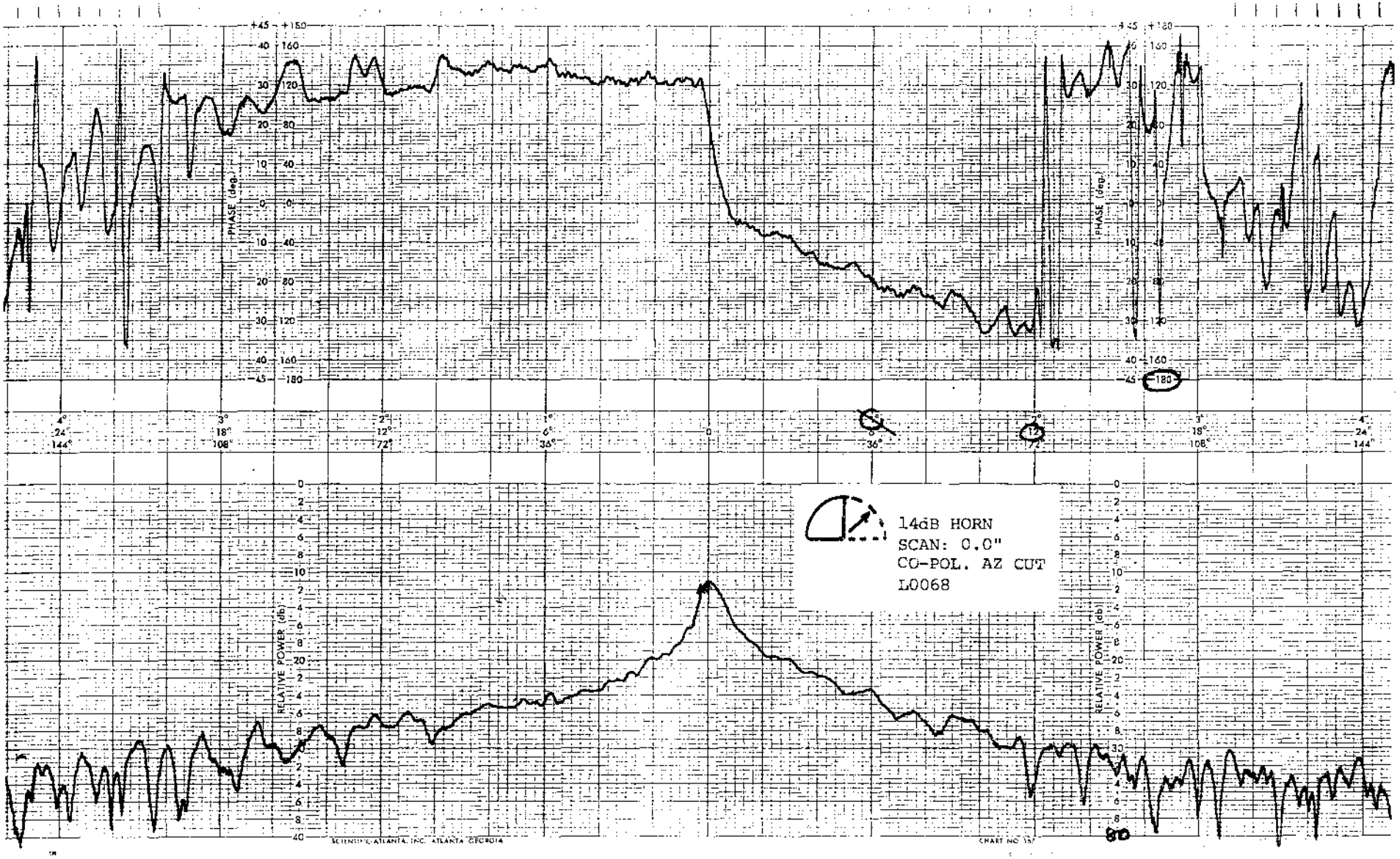

14dB HORN
SCAN: 6.5"
CO-POL. AZ CUT
AANC1
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC ATLANTA, INC. ATLANTA, GEORGIA

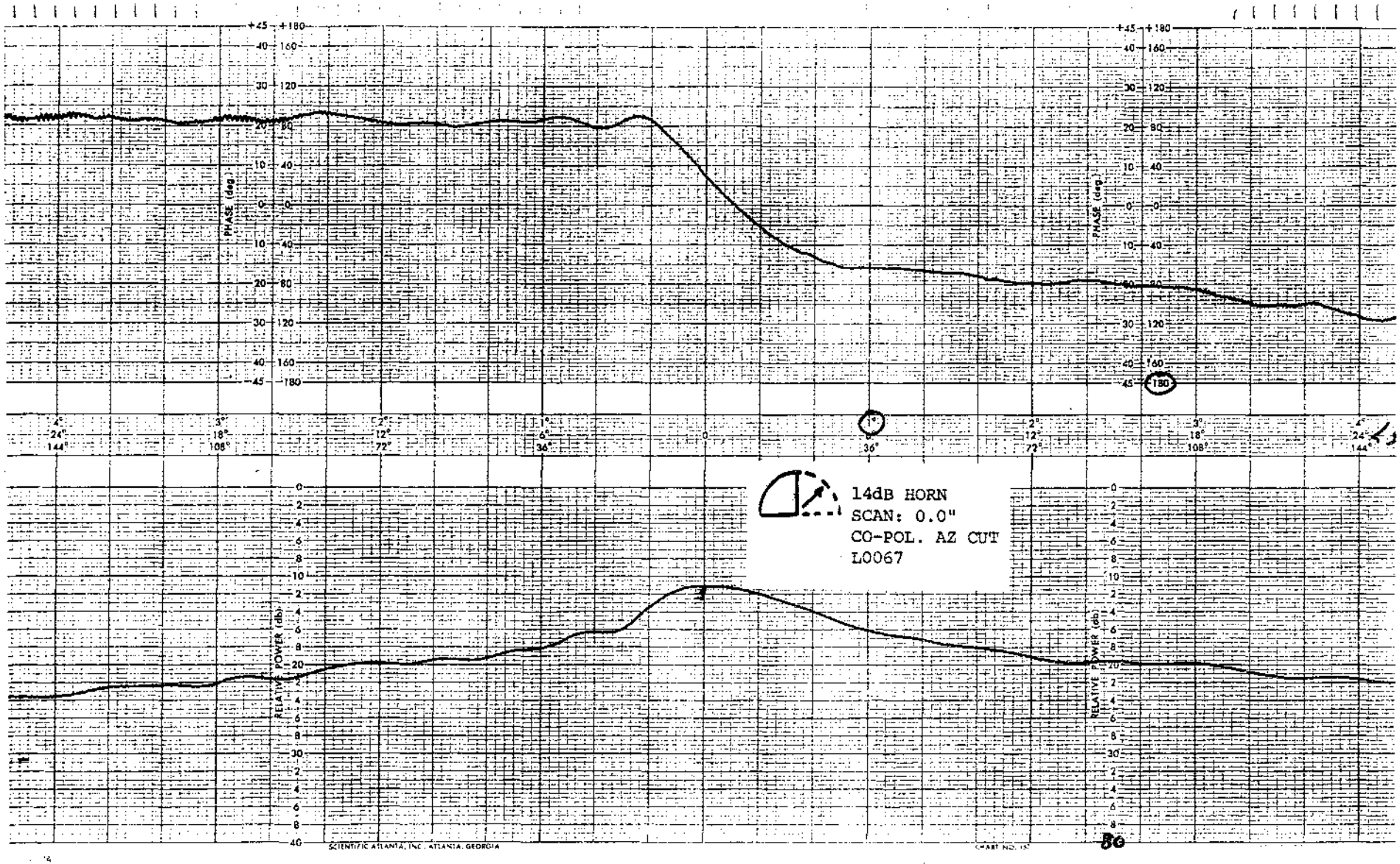

PHASE (deg.)
RELATIVE POWER (db)
14dB HORN
SCAN: 6.5"
CO-POL. EL CUT
EANC1

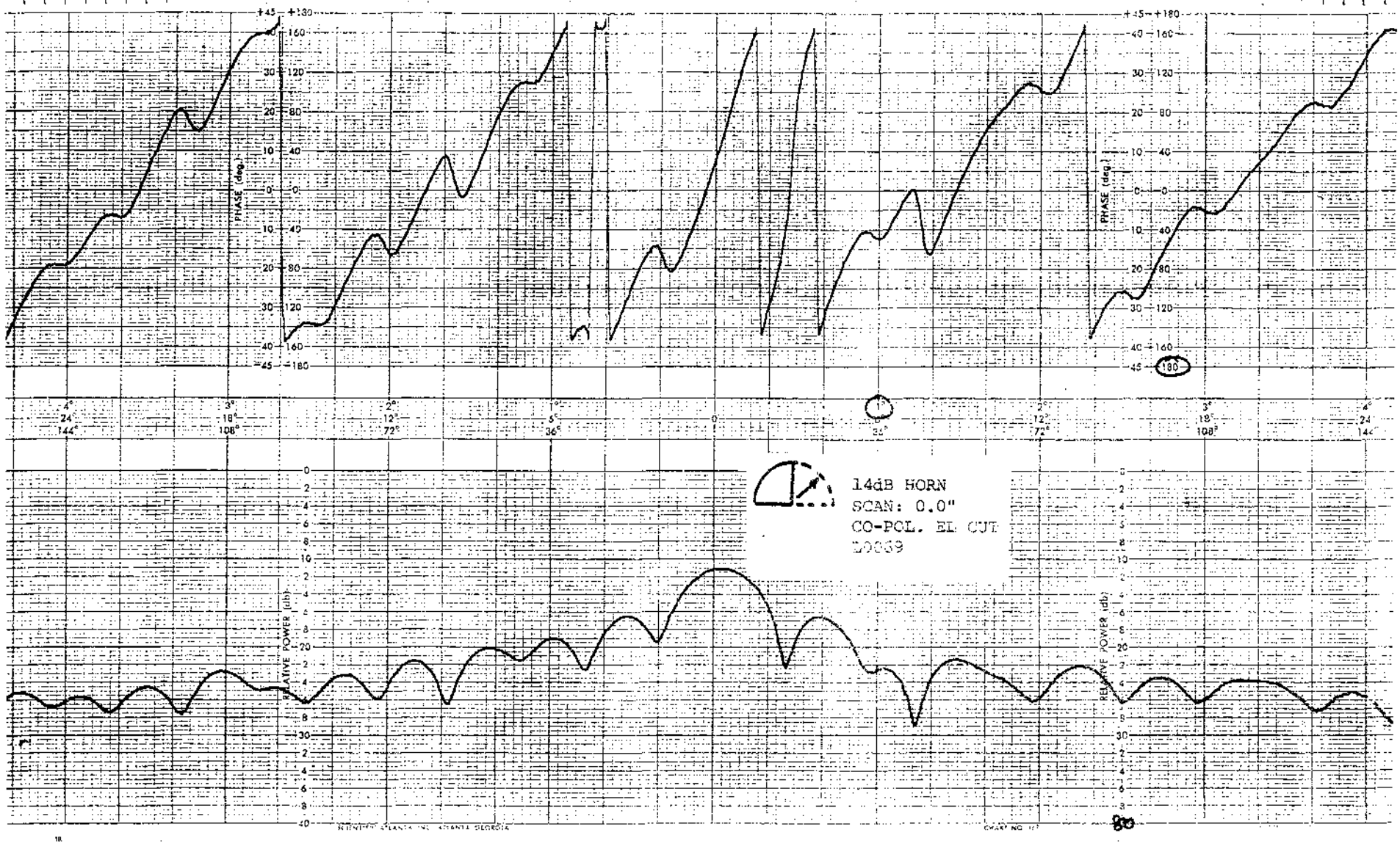

14dB HORN
SCAN: 6.5"
X-POL. AZ CUT
AXPSC

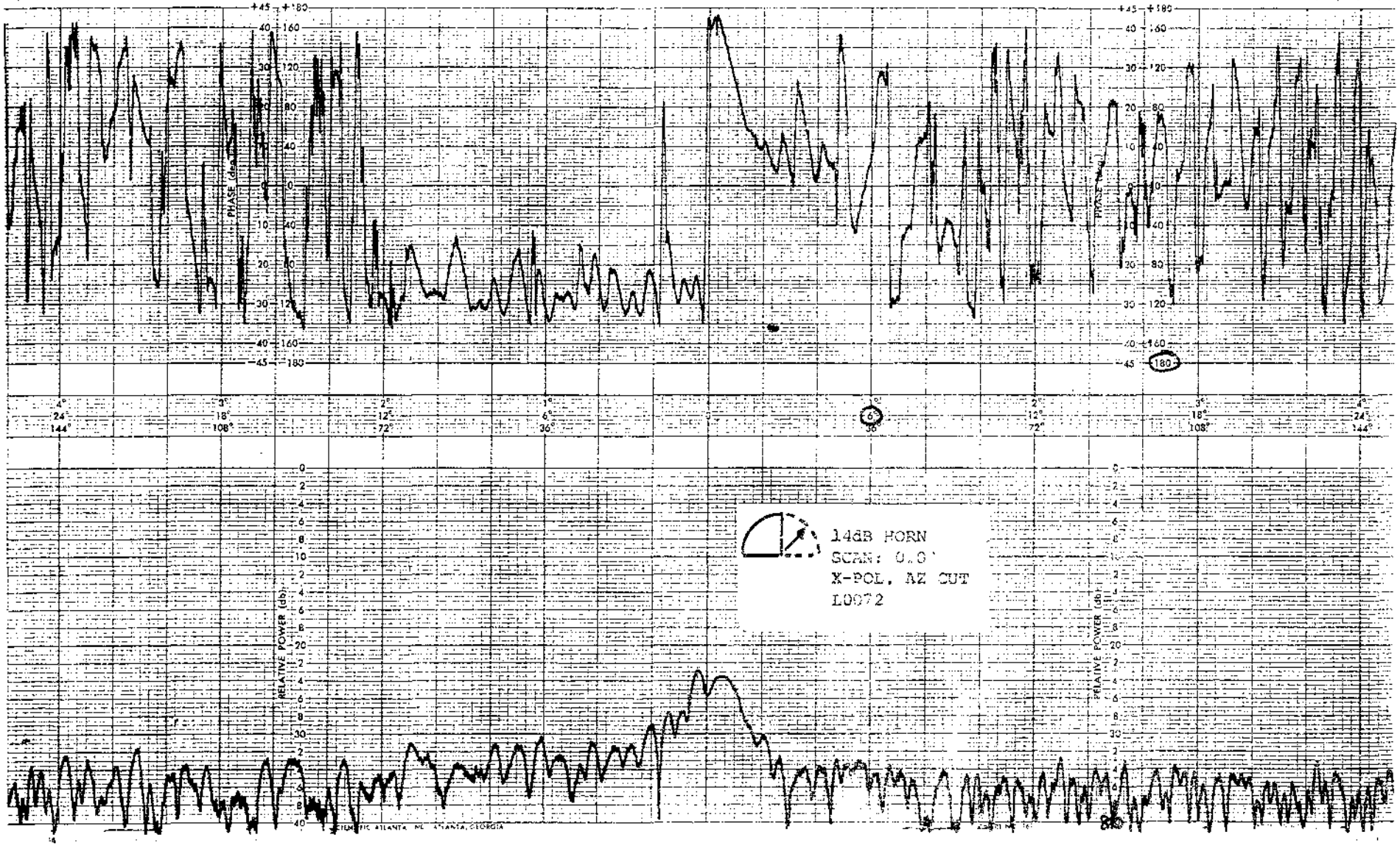

14dB HORN
SCAN: 6.5"
X-PCL. AZ CUT
AZPSC
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA
CHART NO. 167

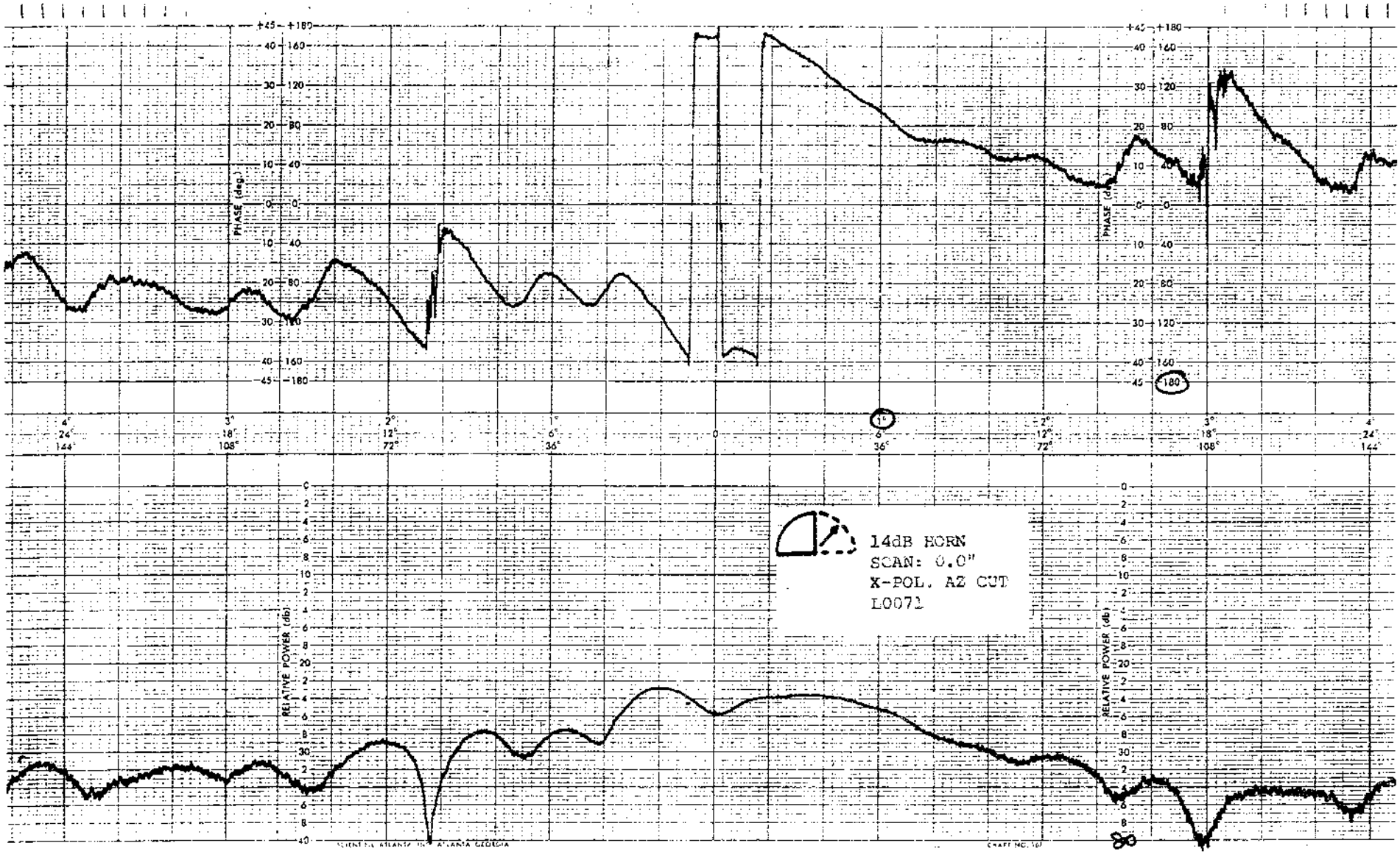

PHASE (deg.)
RELATIVE POWER (db)
14dB HORN
SCAN: 6.5"
X-POL. EL CUT
EXPSC
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA
CHART NO. 12

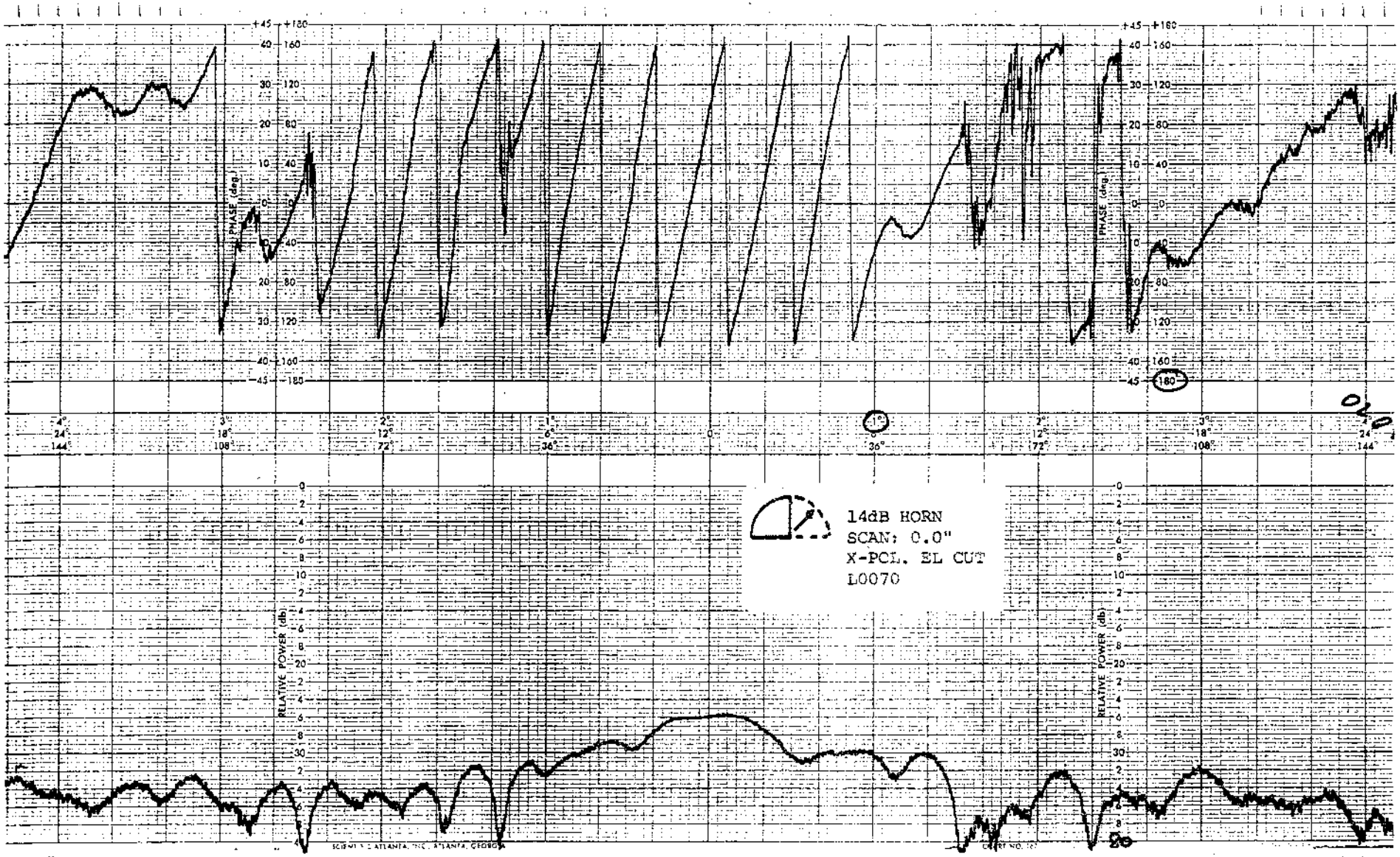

14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
L0068
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC. ATLANTA GEORGIA

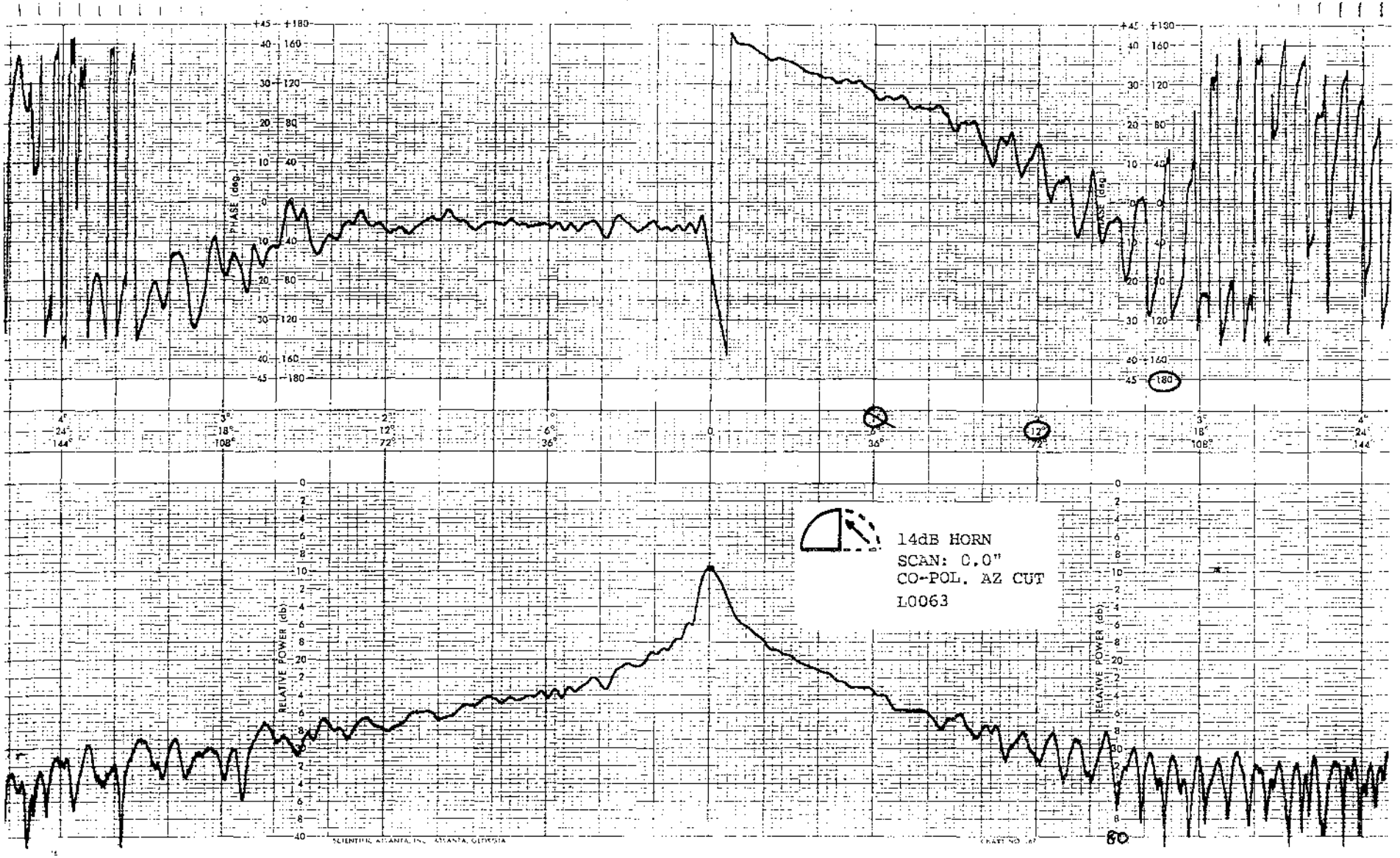

14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
L0067
PHASE (deg)
RELATIVE POWER (dB)
SCIENTIFIC ATLANTA, INC., ATLANTA, GEORGIA

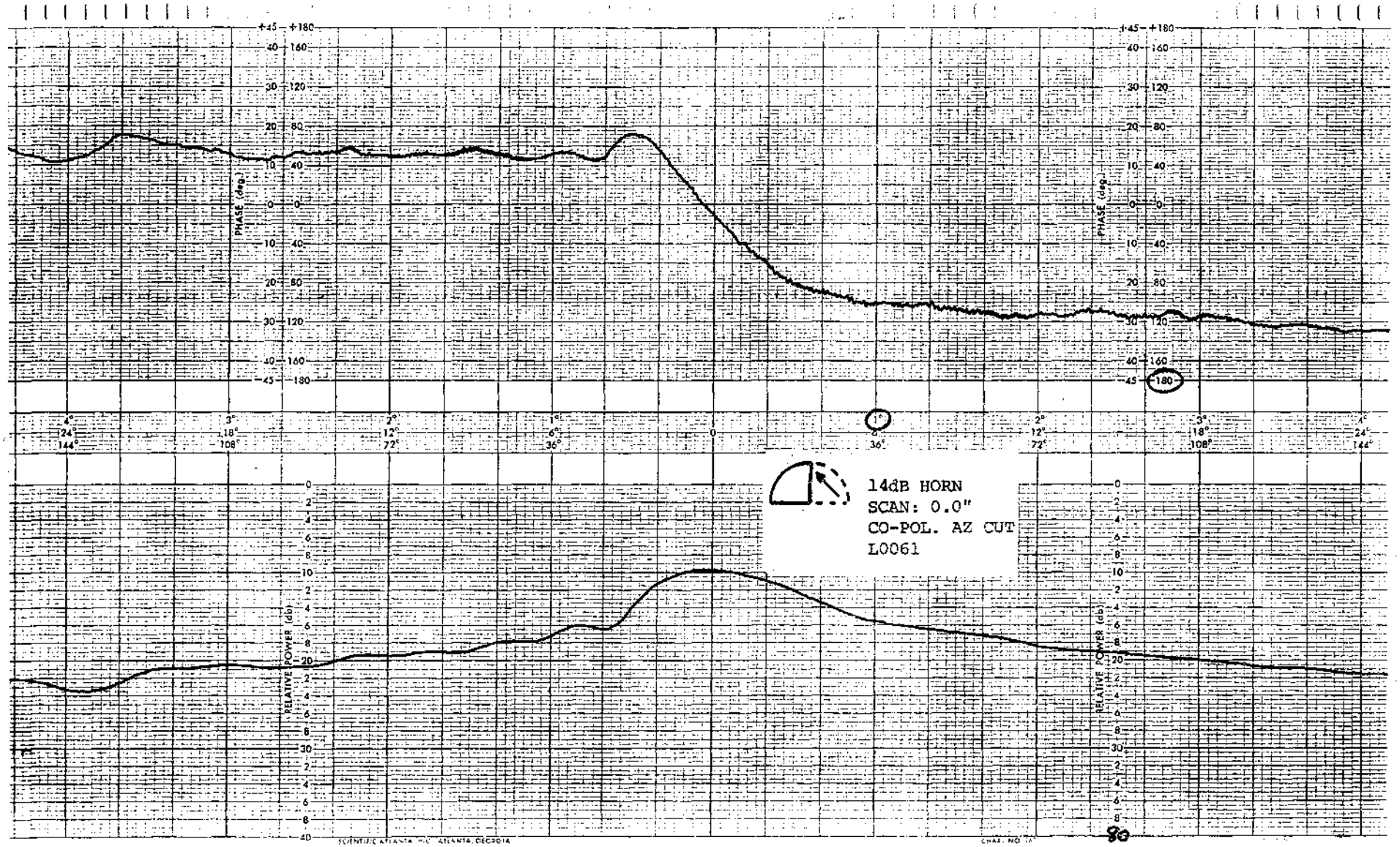

PHASE (deg.)
RELATIVE POWER (db)
14dB HORN
SCAN: 0.0"
CO-POL. EL CUT
20039

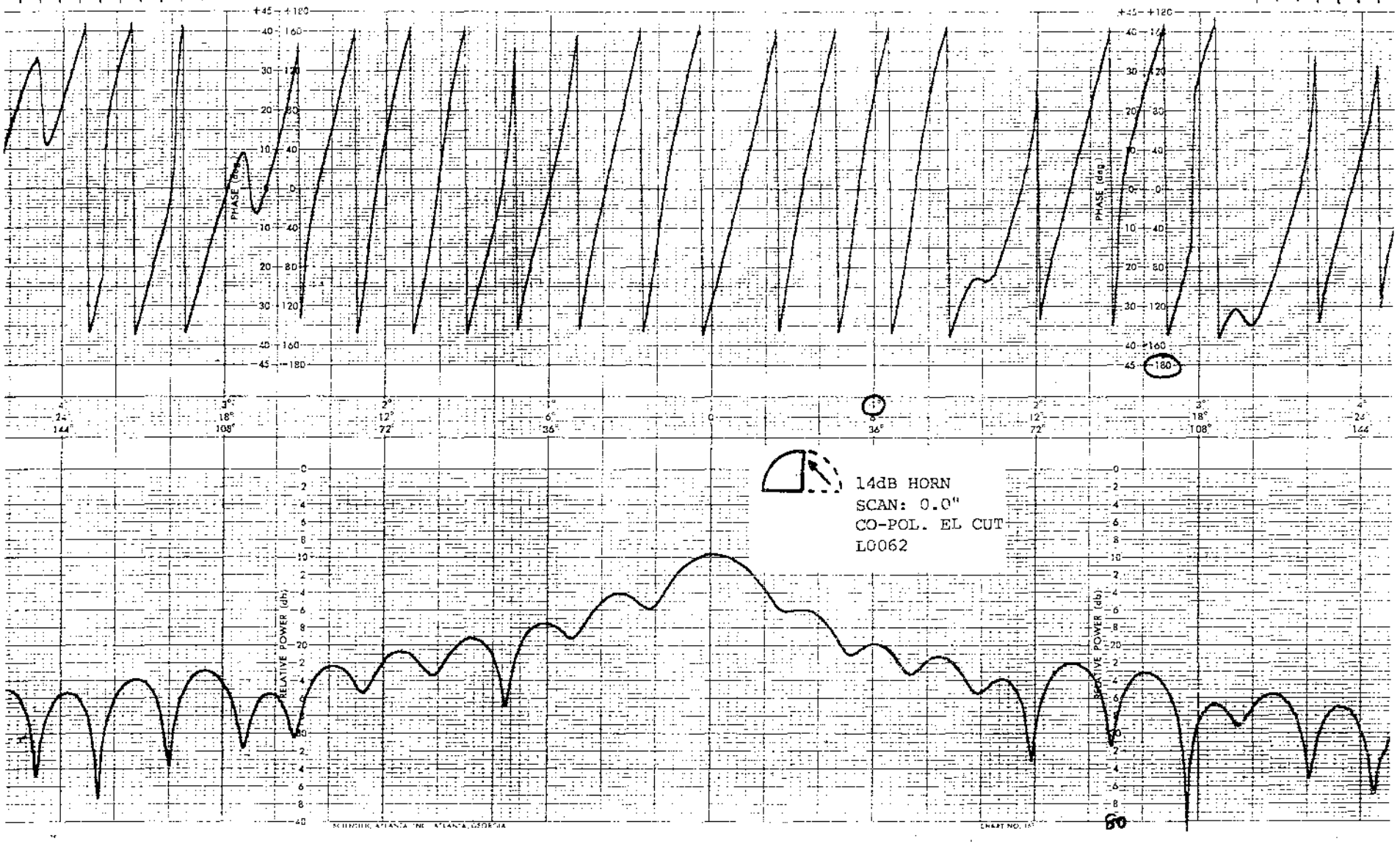

14dB HORN
SCAN: 0.0°
X-POL, AZ CUT
L0072
PHASE (deg)
RELATIVE POWER (db)

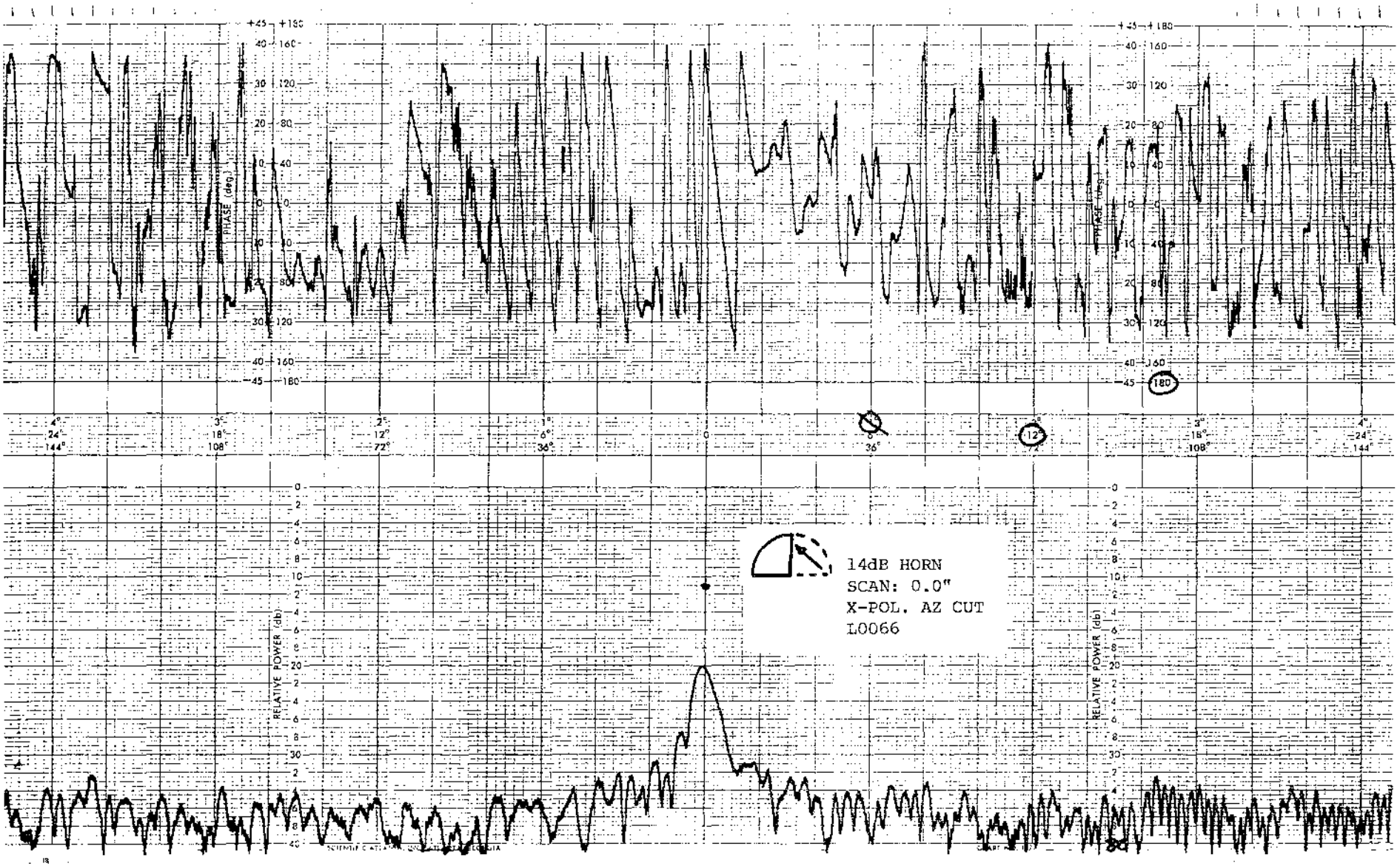

PHASE (deg.)
RELATIVE POWER (db)
14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
L0071

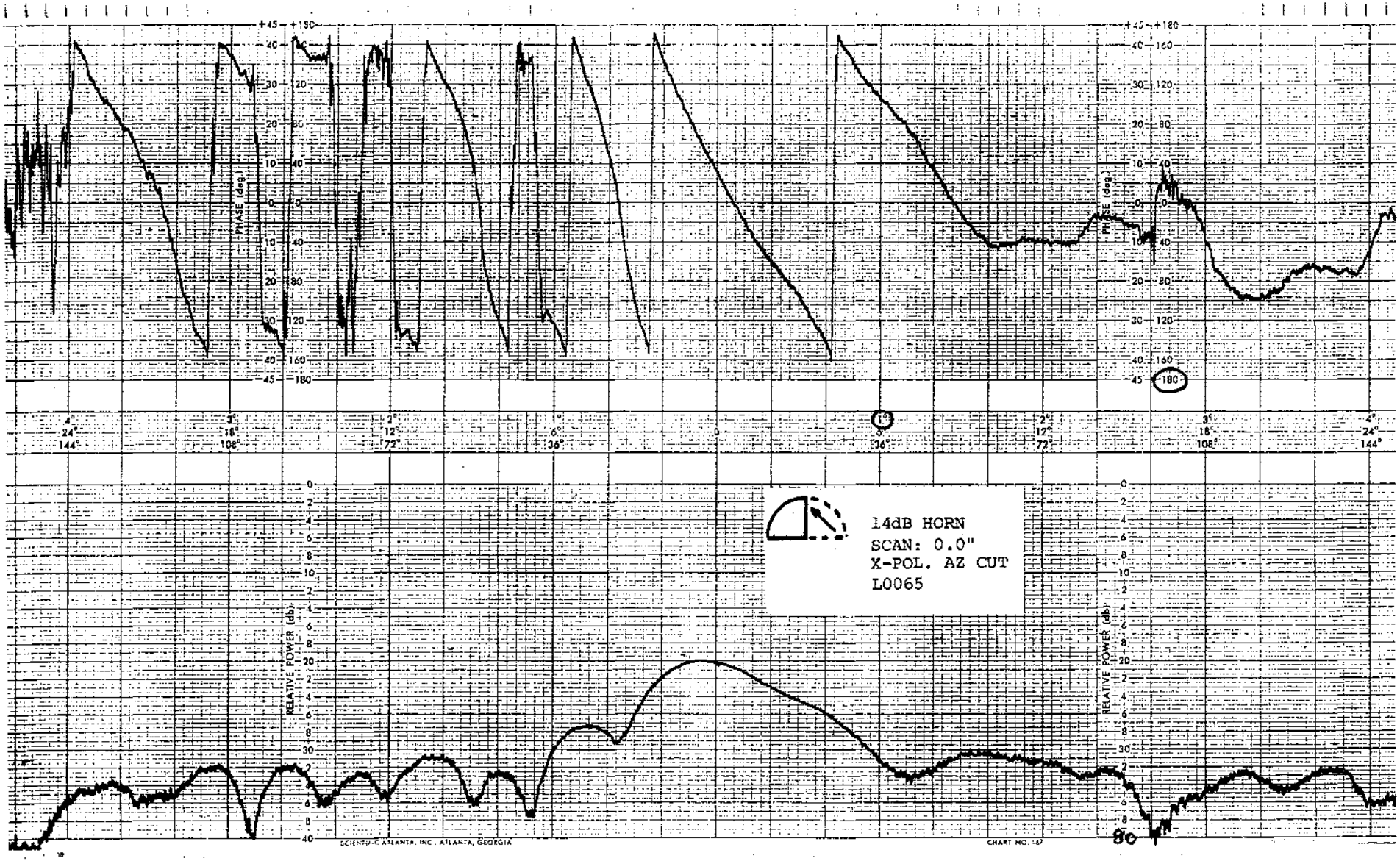

PHASE (deg.)
RELATIVE POWER (db)
14dB HORN
SCAN: 0.0"
X-POL. EL CUT
L0070

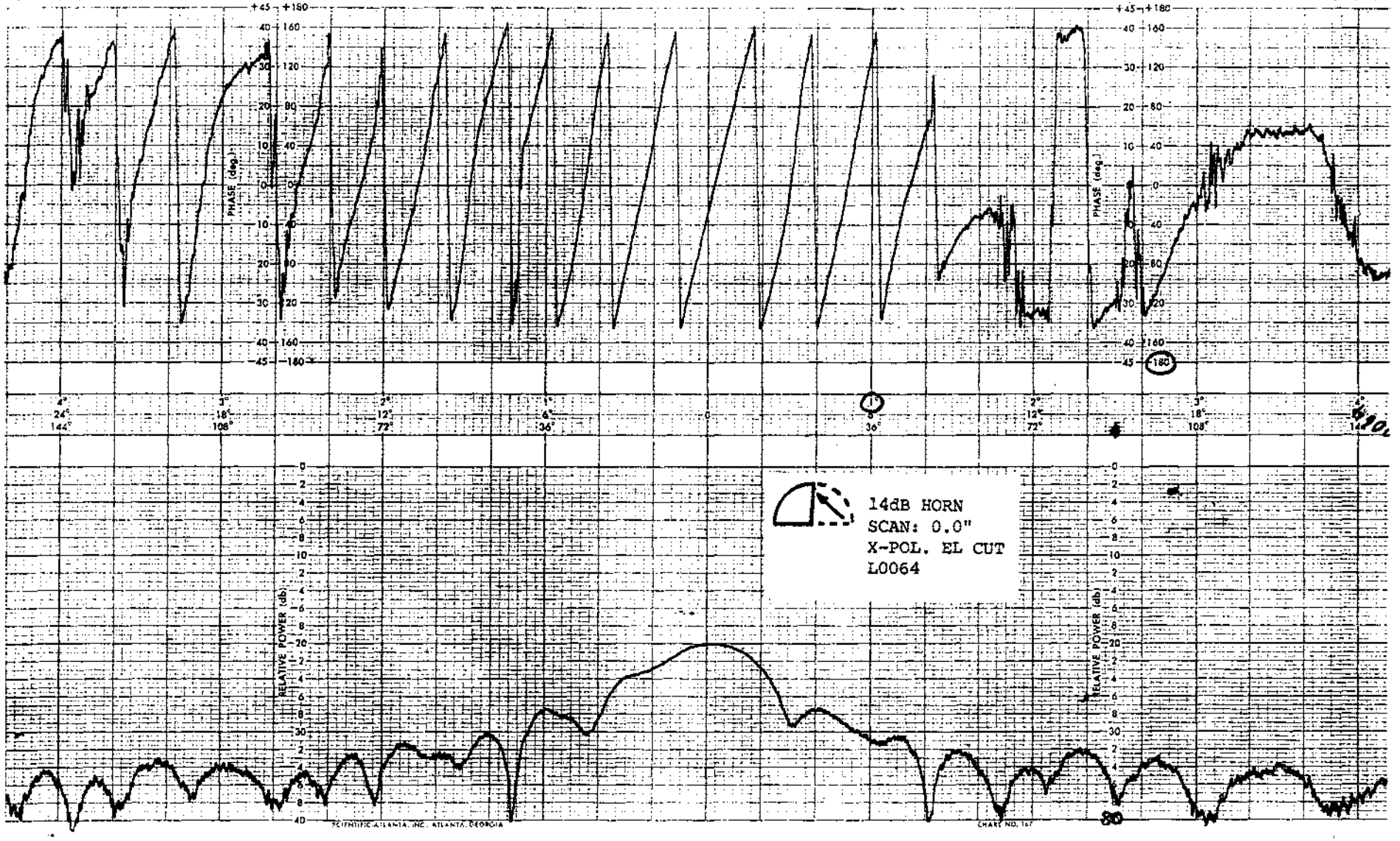

14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
L0063
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC ATLANTA, INC. ATLANTA, GEORGIA


14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
L0061
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC ATLANTA INC. ATLANTA, GEORGIA


14dB HORN
SCAN: 0.0"
CO-POL. EL CUT
L0062
PHASE (deg)
RELATIVE POWER (db)


14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
L0066
PHASE (deg)
RELATIVE POWER (db)

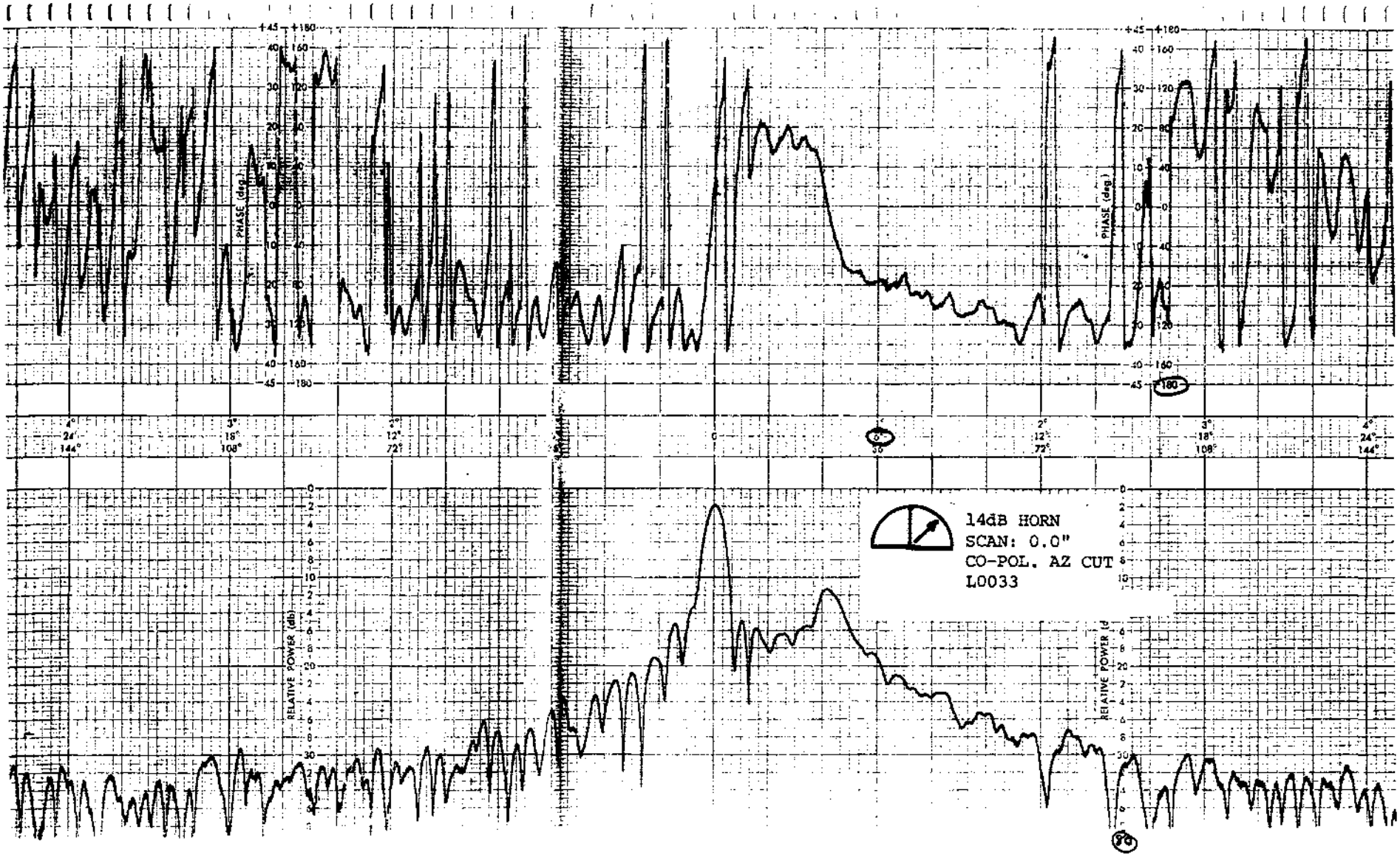

14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
L0065
PHASE (deg)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA
CHART NO. 167

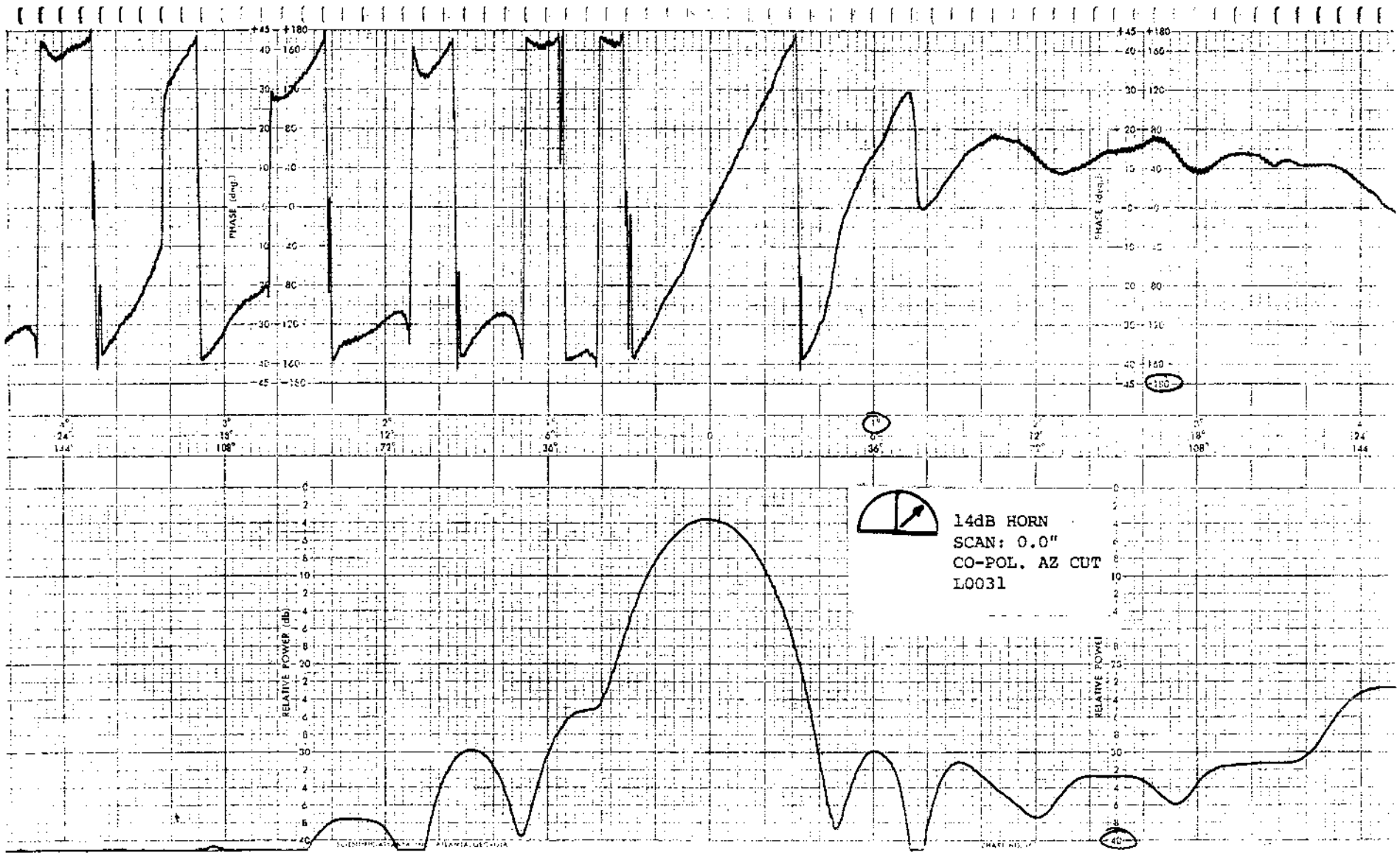

PHASE (deg.)
RELATIVE POWER (db)
14dB HORN
SCAN: 0.0"
X-POL. EL CUT
L0064
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA
CHART NO. 167

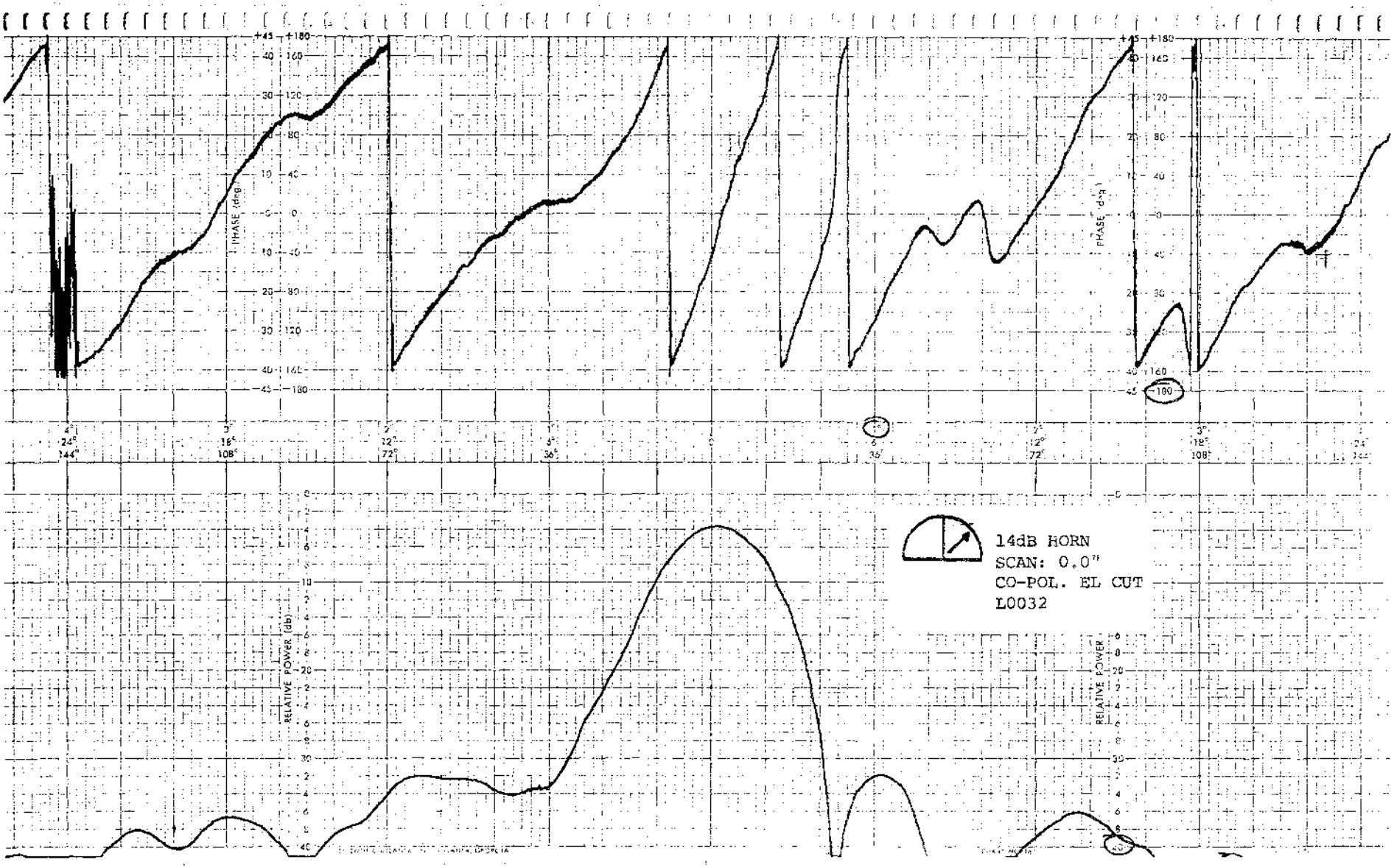
LSST - VIII

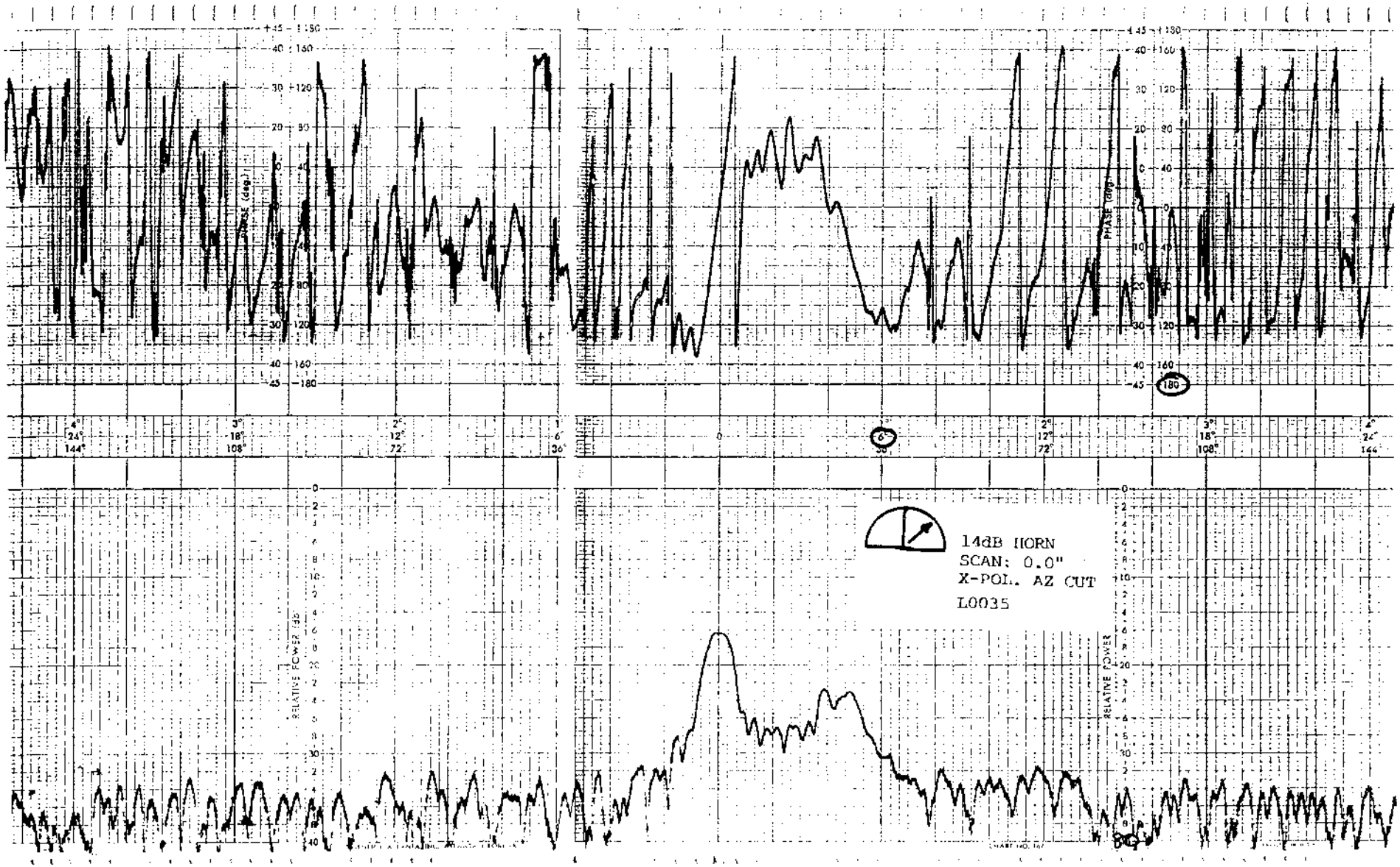
SECONDARY PATTERN LOG

CONFIGURATION	HORN	SCAN	POL.	PK. GAIN	PATTERN	FILE NAME	PAGE NUMBER
	14 dB	0.0"	CO	50.39	$\pm$ 45° AZ	L0033	246
	"	"	CO	"	$\pm$ 5° AZ	L0031	247
	"	"	CO	"	$\pm$ 5° EL	L0032	248
	"	"	X	-	$\pm$ 45° AZ	L0035	249
	"	"	X	-	$\pm$ 5° AZ	L0034	250
	"	"	X	-	$\pm$ 5° EL	L0036	251
	14 dB	0.0"	CO	-	+3°EL $\pm$ 45°AZ	R2101	252
	"	"	"	-	+2°EL "	R2102	253
	"	"	"	-	+1°EL "	R2103	254
	"	"	"	50.55	0°EL "	R2104	255
	"	"	"	-	-1°EL "	R2105	256
	"	"	"	-	-2°EL "	R2106	257
	"	"	"	-	-3°EL "	R2107	258
	14 dB	0.0"	X	-	+3°EL $\pm$ 45°AZ	R2201	259
	"	"	"	-	+2°EL "	R2202	260
	"	"	"	-	+1°EL "	R2203	261
	"	"	"	-	0°EL "	R2204	262
	"	"	"	-	-1°EL "	R2205	263
	"	"	"	-	-2°EL "	R2206	264
	"	"	"	-	-3°EL "	R2207	265
	14 dB	4.5"	CO	50.00	$\pm$ 45° AZ	L0039	266
	"	"	CO	"	$\pm$ 5° AZ	L0037	267
	"	"	CO	"	$\pm$ 5° EL	L0038	268
	"	"	X	-	$\pm$ 45° AZ	L0042	269
	"	"	X	-	$\pm$ 5° AZ	L0040	270
	"	"	X	-	$\pm$ 5° EL	L0041	271
	14 dB	0.0"	CO	50.55	$\pm$ 45° AZ	L0057	272
	"	"	CO	"	$\pm$ 5° AZ	L0055	273
	"	"	CO	"	$\pm$ 5° EL	L0056	274
	"	"	X	-	$\pm$ 45° AZ	L0060	275
	"	"	X	-	$\pm$ 5° AZ	L0058	276
	"	"	X	-	$\pm$ 5° EL	L0059	277

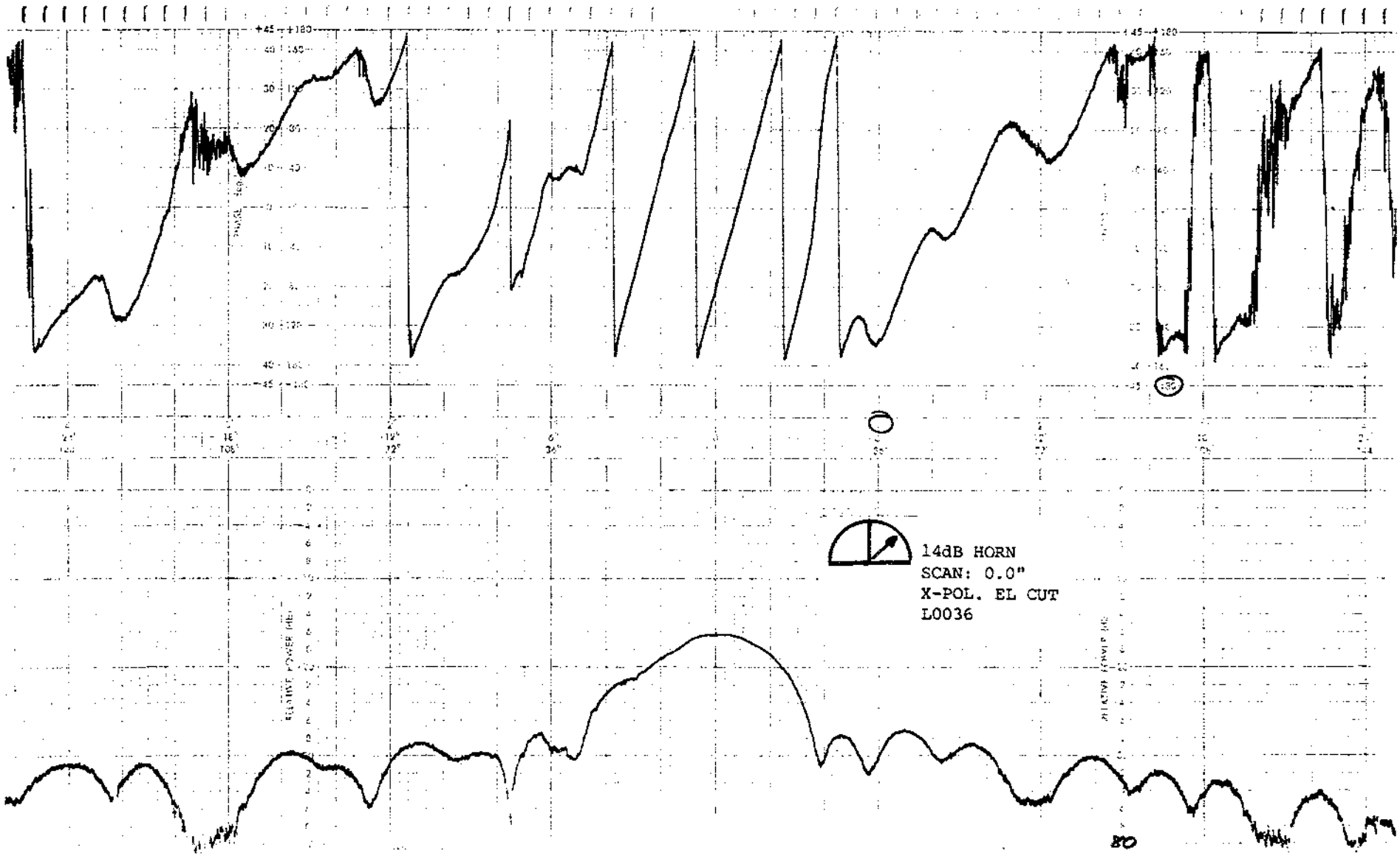

14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
L0033
PHASE (deg)
RELATIVE POWER (db)

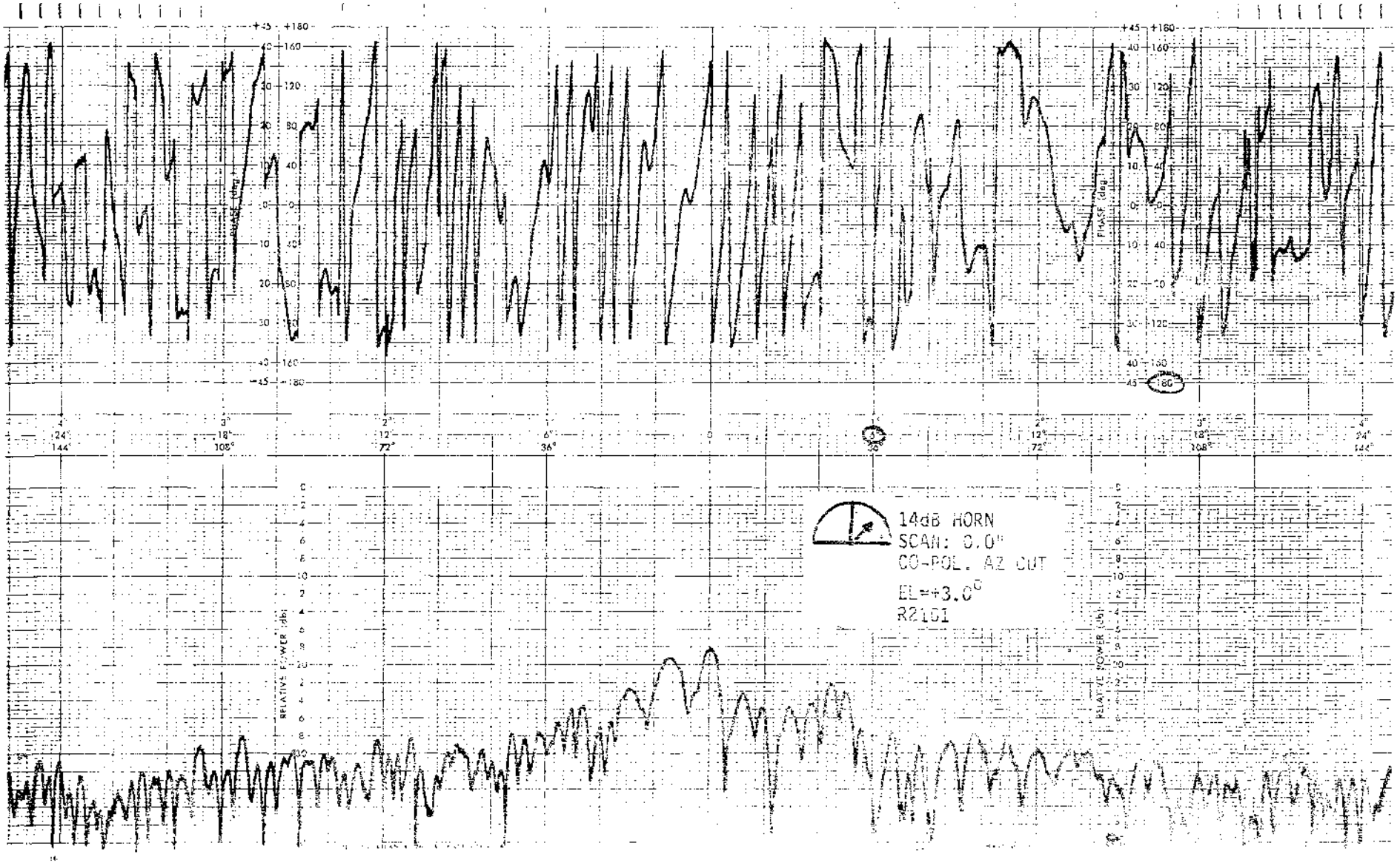

PHASE (deg.)
RELATIVE POWER (db)
14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
L0031

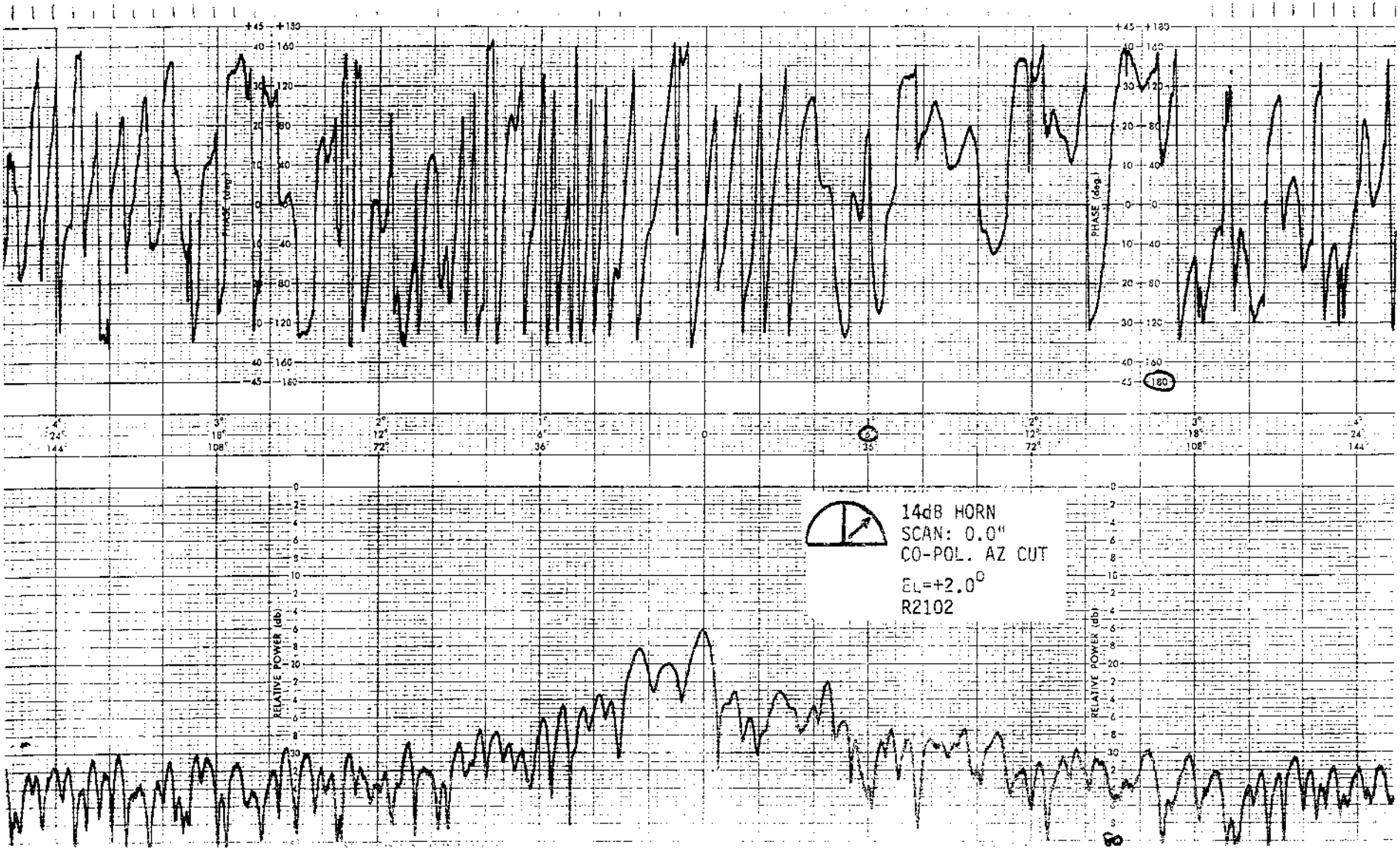

PHASE (deg)
RELATIVE POWER (db)
14dB HORN
SCAN: 0.0°
CO-POL. EL CUT
L0032

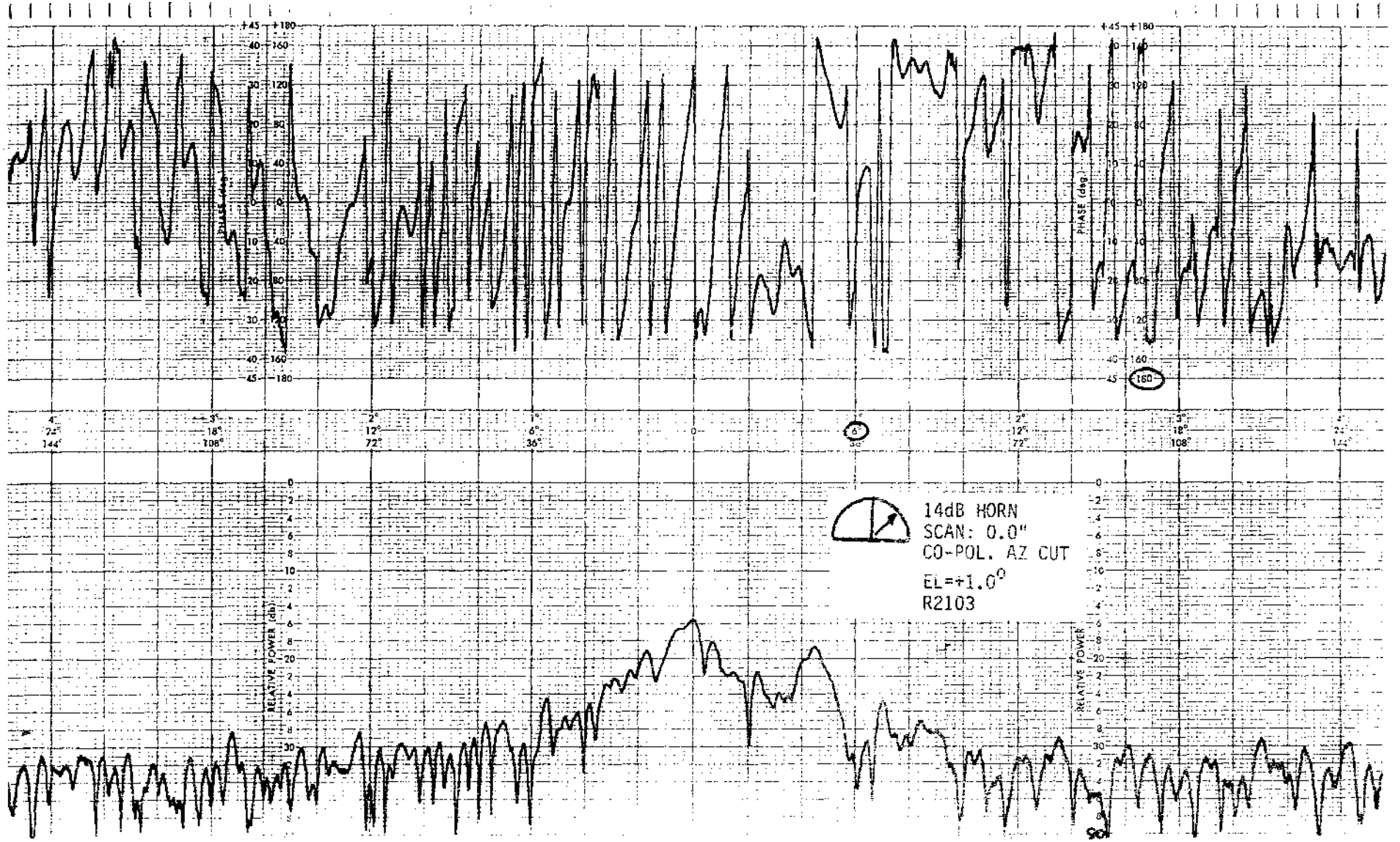

14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
L0035
PHASE (deg)
RELATIVE POWER (dB)

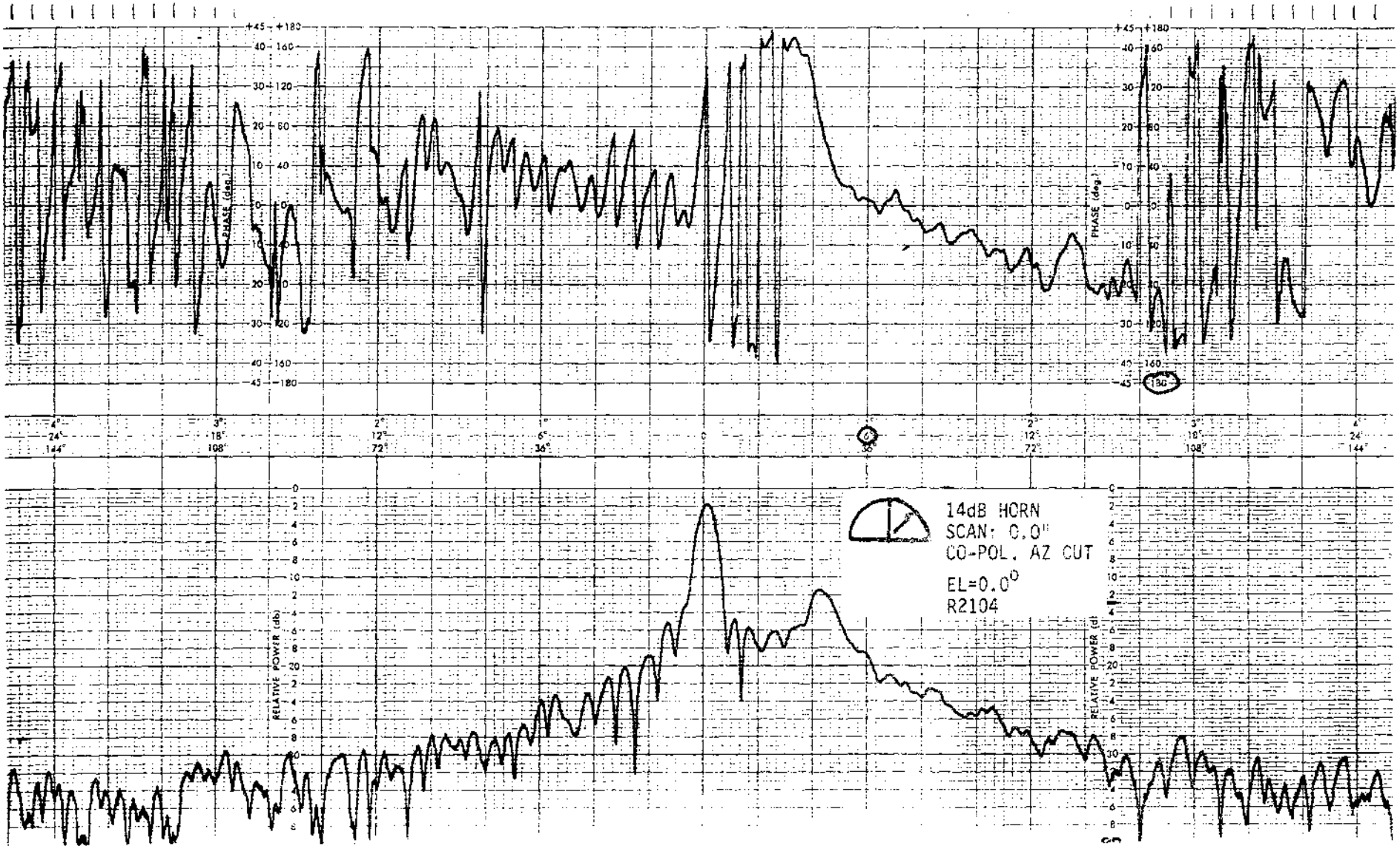
PHASE (deg.)
RELATIVE POWER (db)
14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
L0034

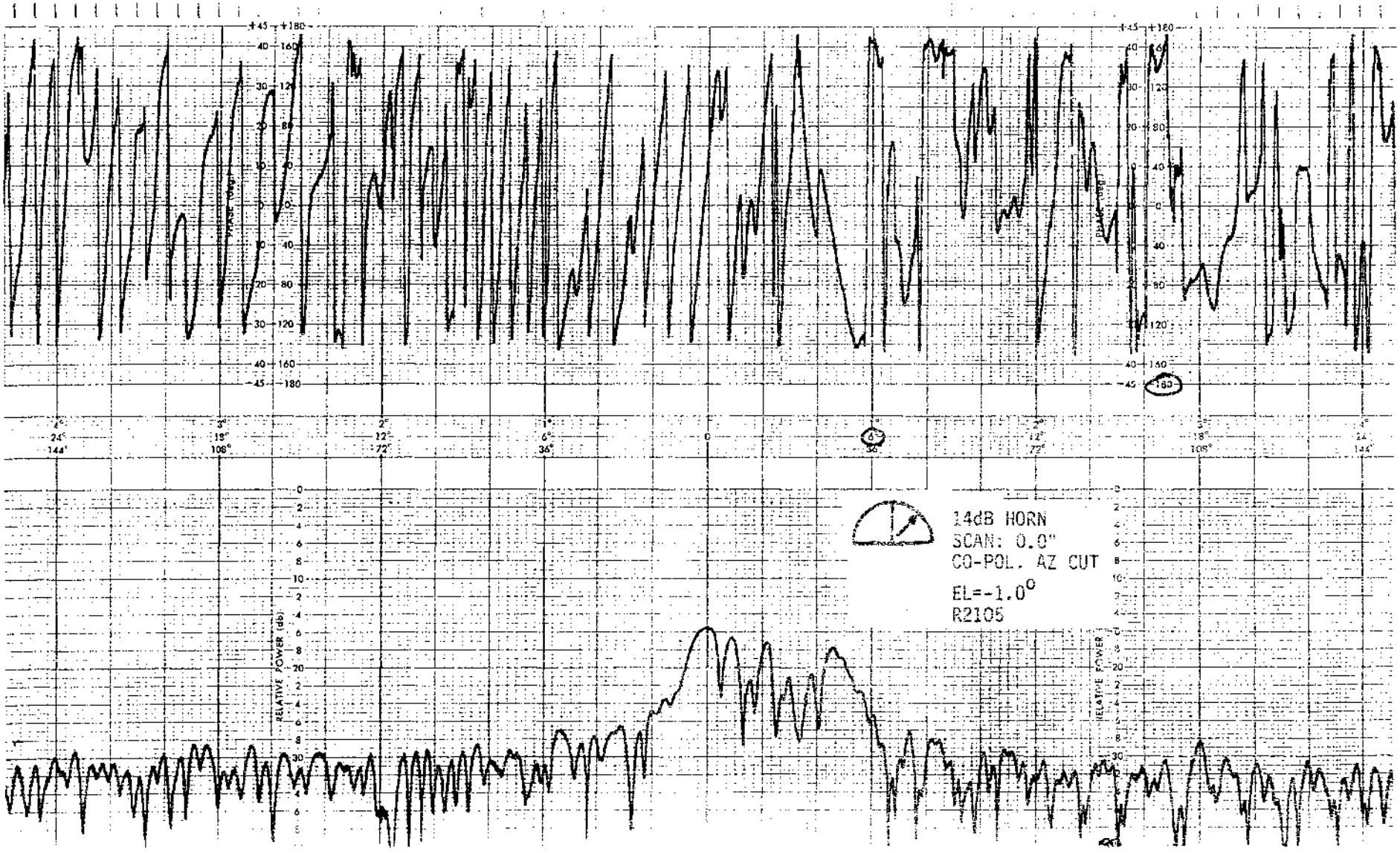

14dB HORN
SCAN: 0.0"
X-POL. EL CUT
L0036

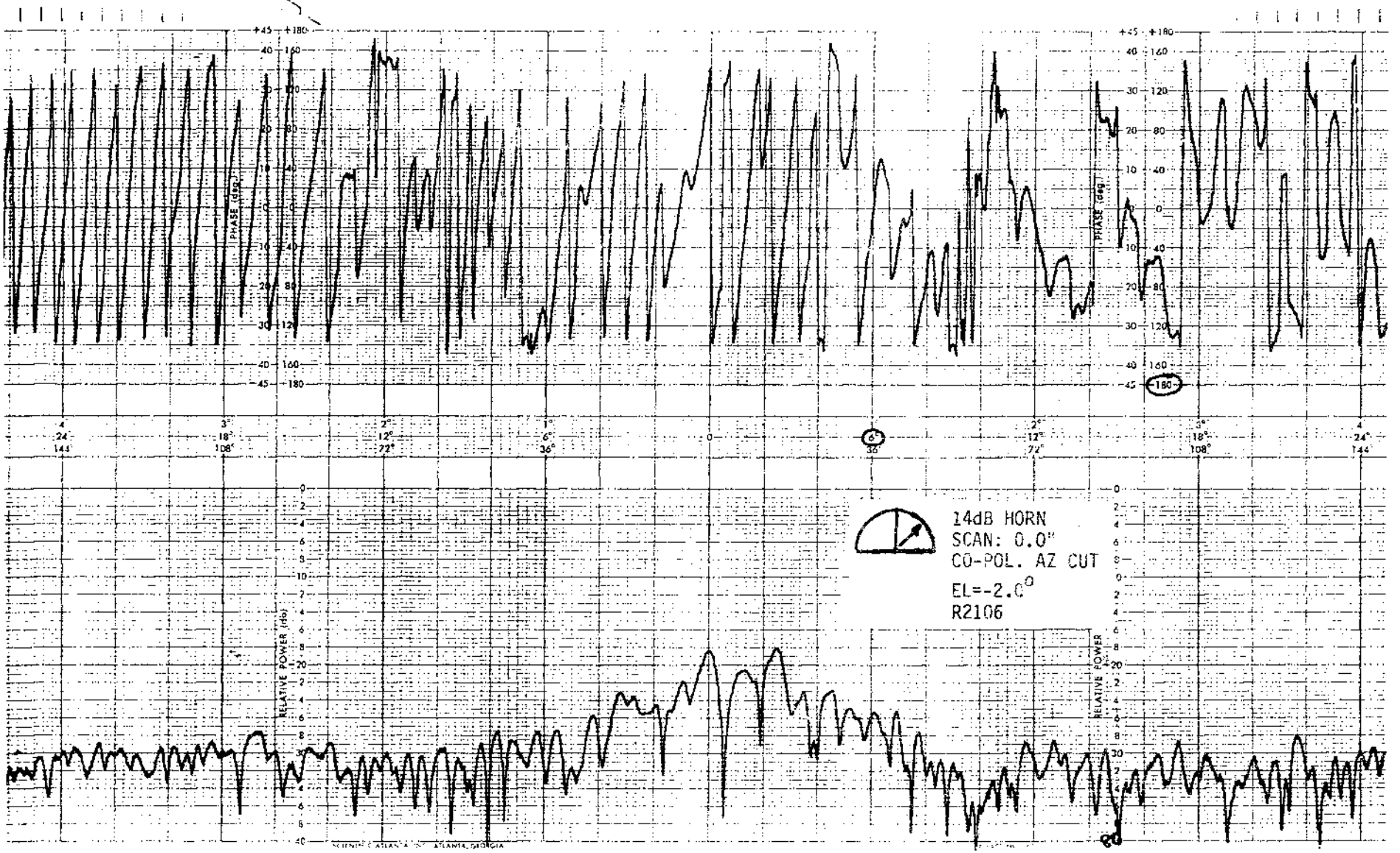

14dB HORN
SCAN: 0.0°
CO-POL. AZ CUT
EL=+3.0°
R21D1
PHASE (deg)
RELATIVE POWER (db)

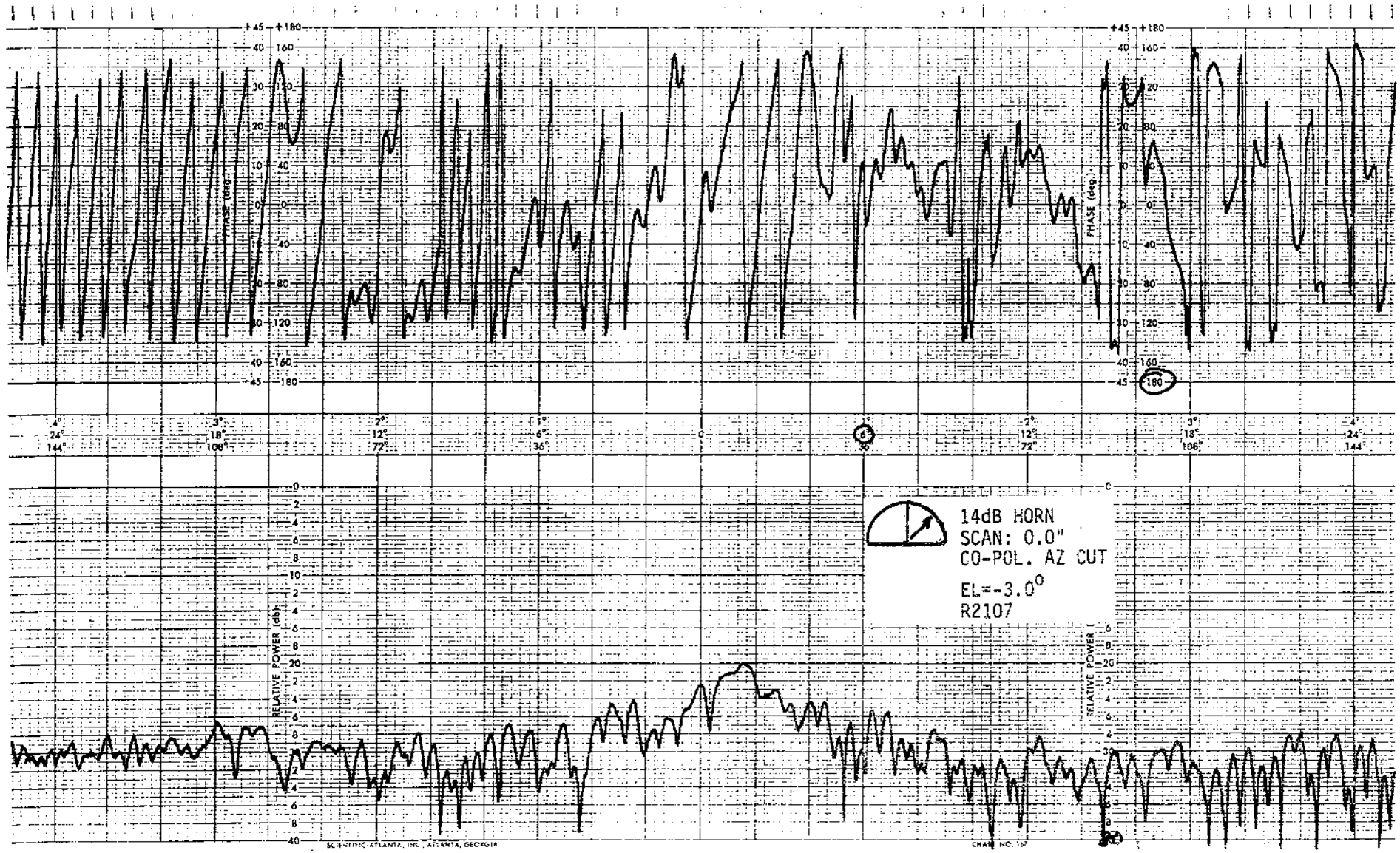

PHASE (deg.)
RELATIVE POWER (db)
14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=+2.0°
R2102

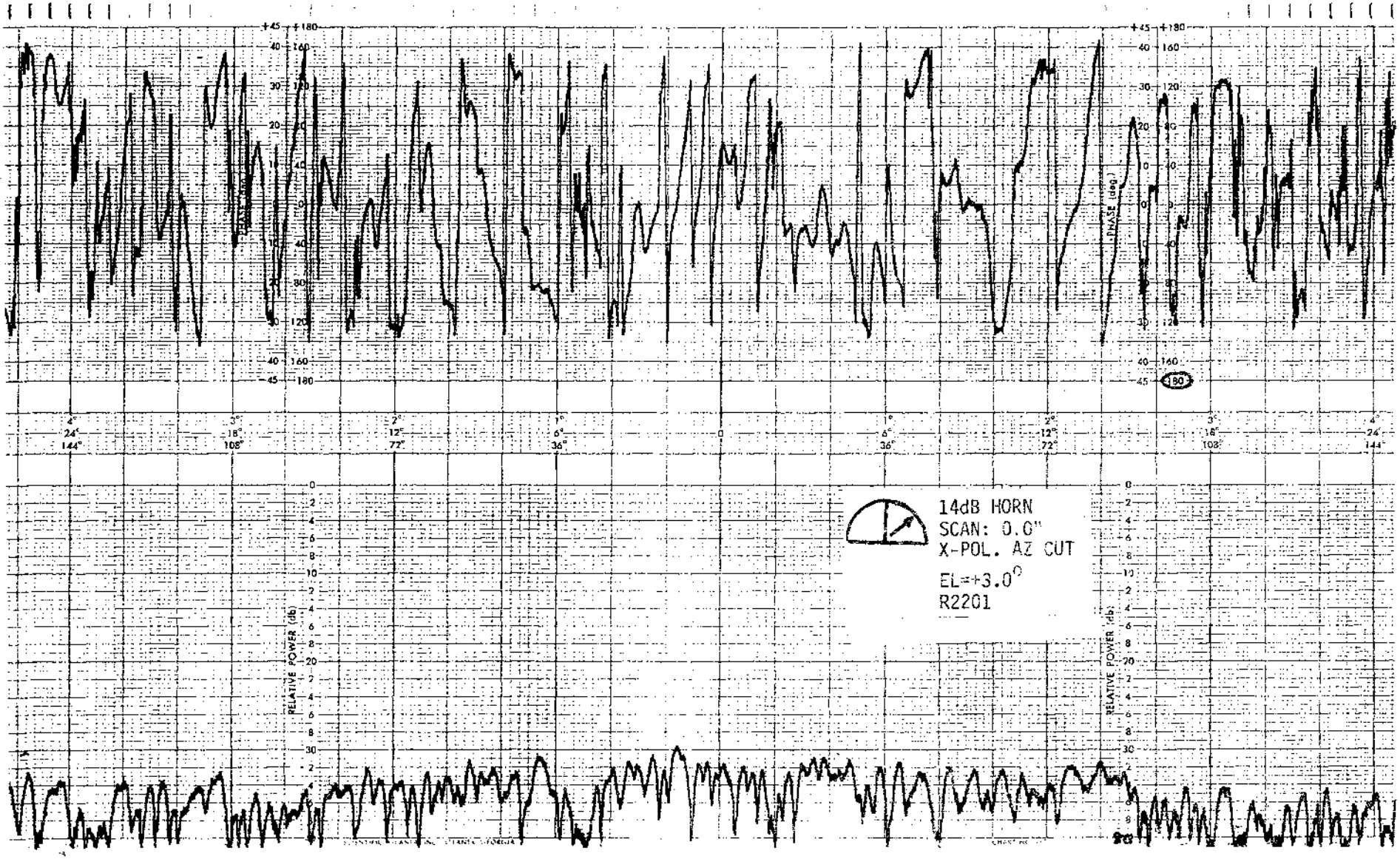

14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=+1.0°
R2103
PHASE (deg.)
RELATIVE POWER (db)

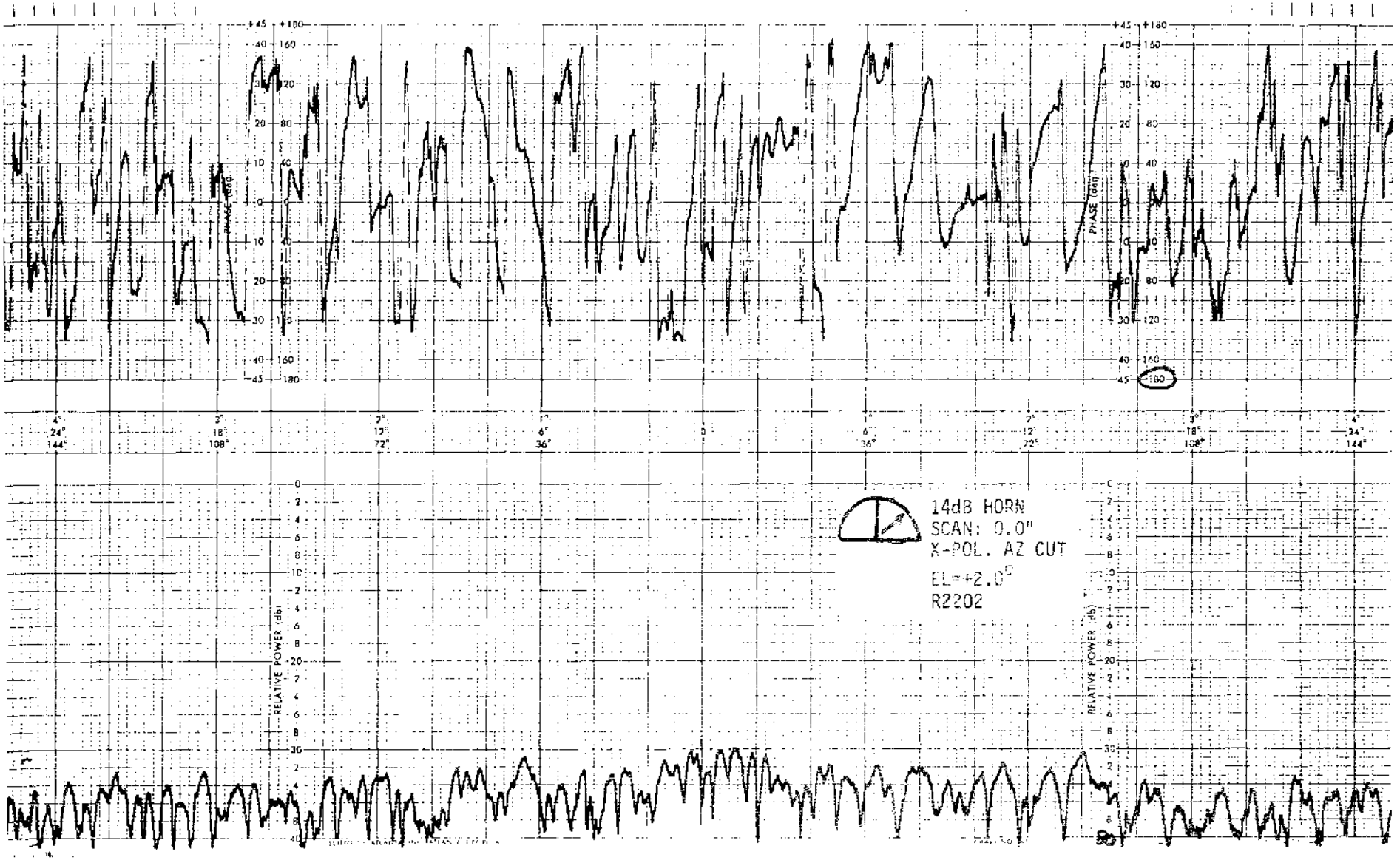

14dB HORN
SCAN: 0.0°
CO-POL. AZ CUT
EL=0.0°
R2104
PHASE (deg)
RELATIVE POWER (db)

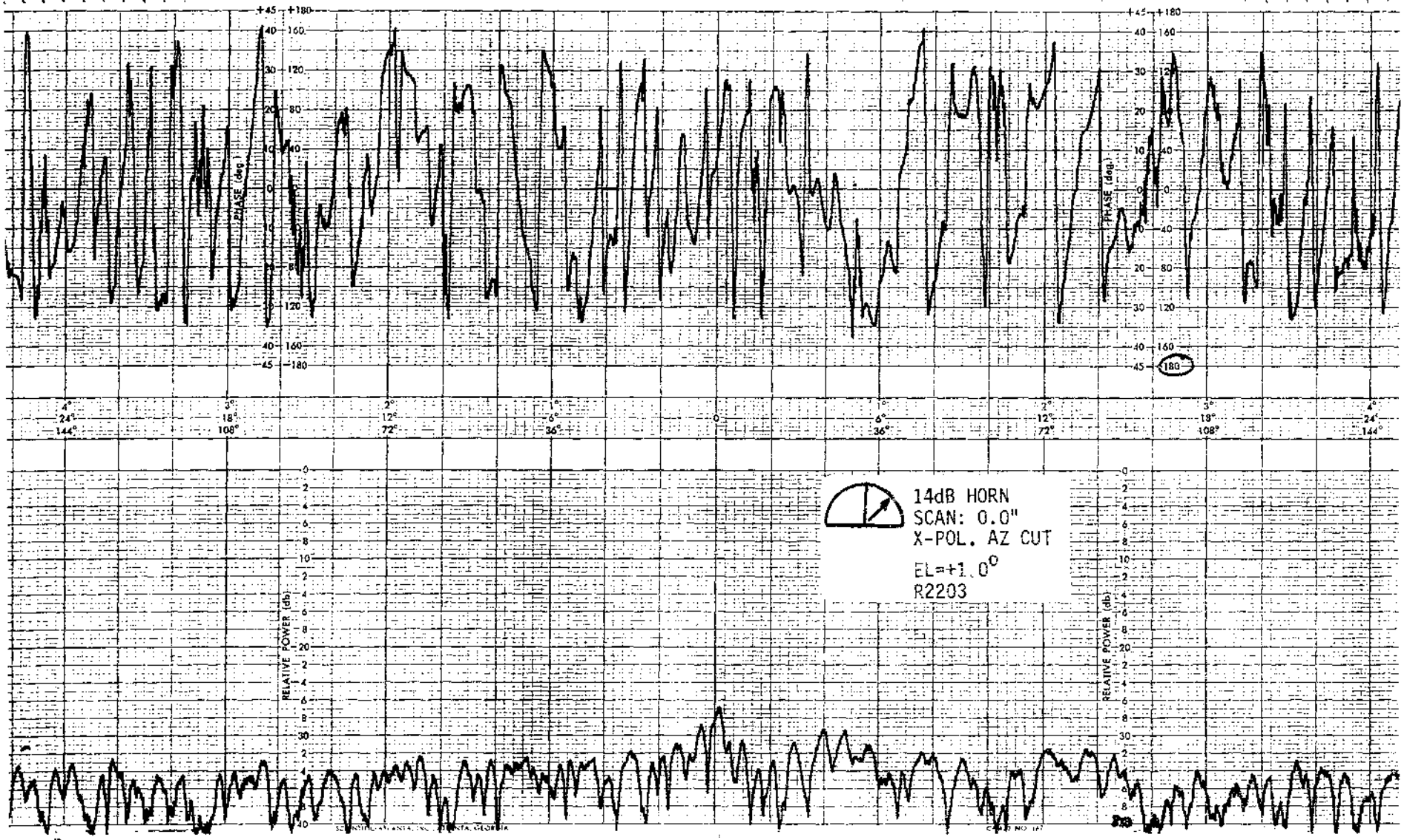

14dB HORN
SCAN: 0.0°
CO-POL. AZ CUT
EL=-1.0°
R2105
RELATIVE POWER (db)

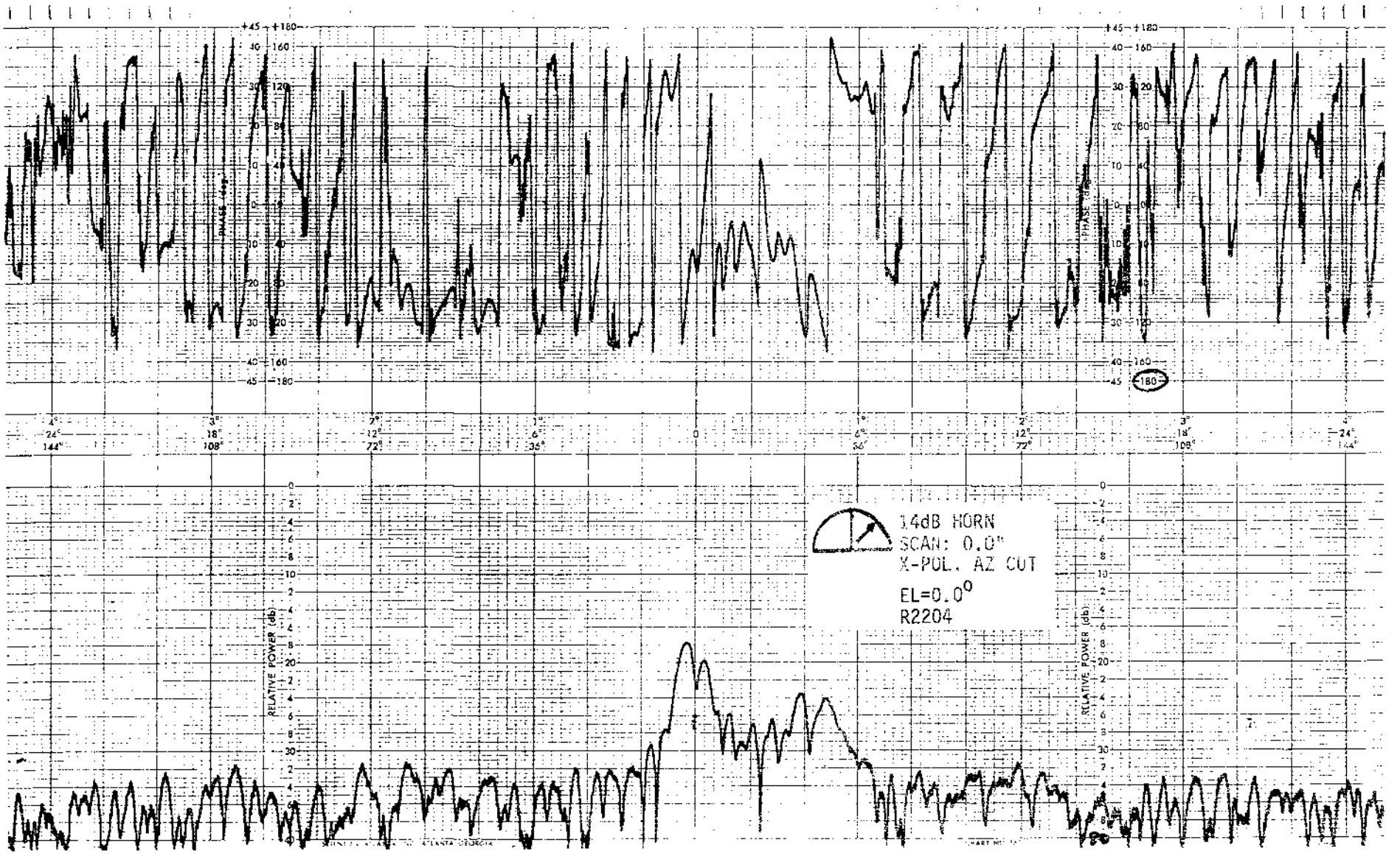

14dB HORN
SCAN: 0.0°
CO-POL. AZ CUT
EL=-2.0°
R2106
PHASE (deg)
RELATIVE POWER (dB)

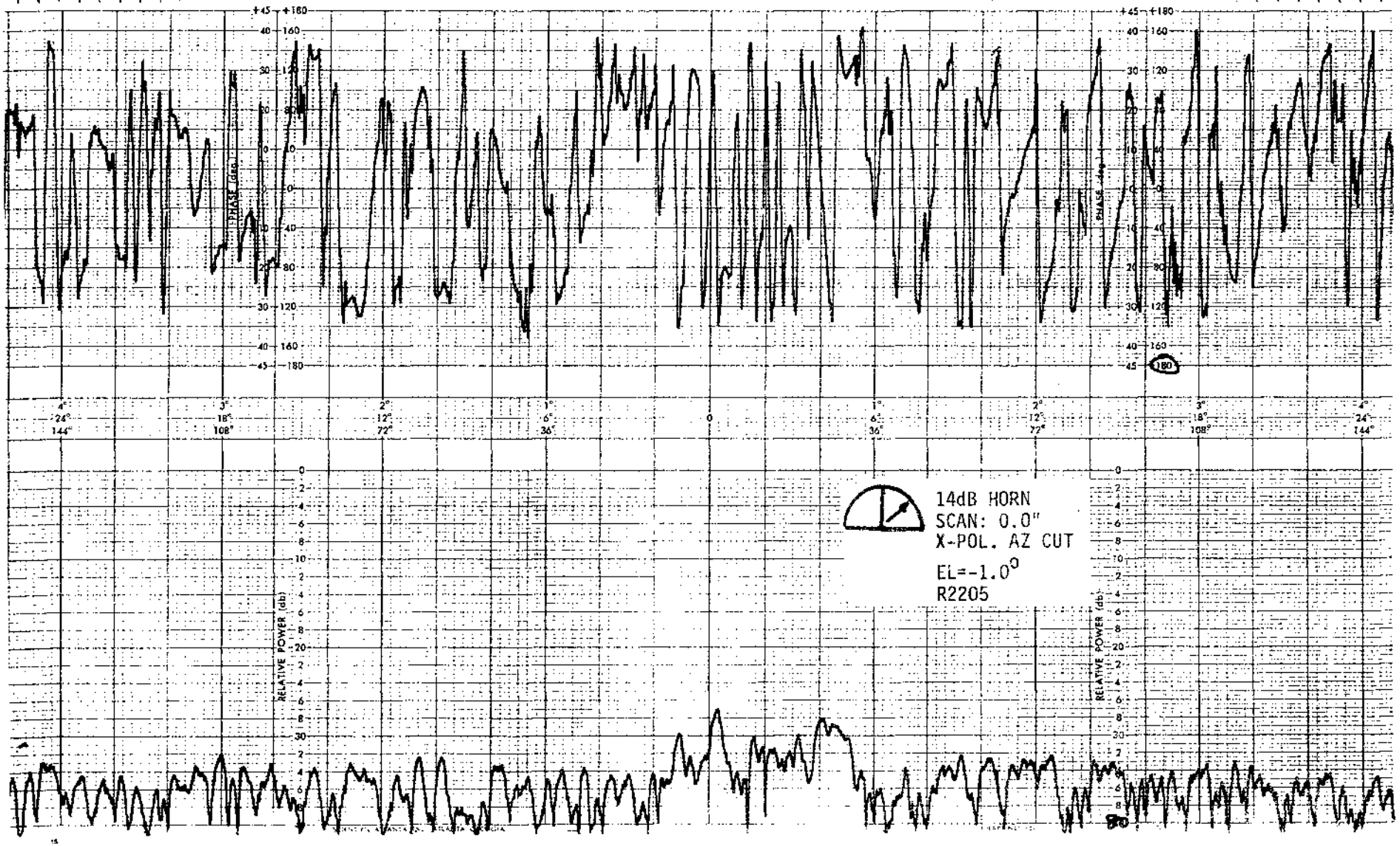

14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=-3.0°
R2107
PHASE (deg)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA

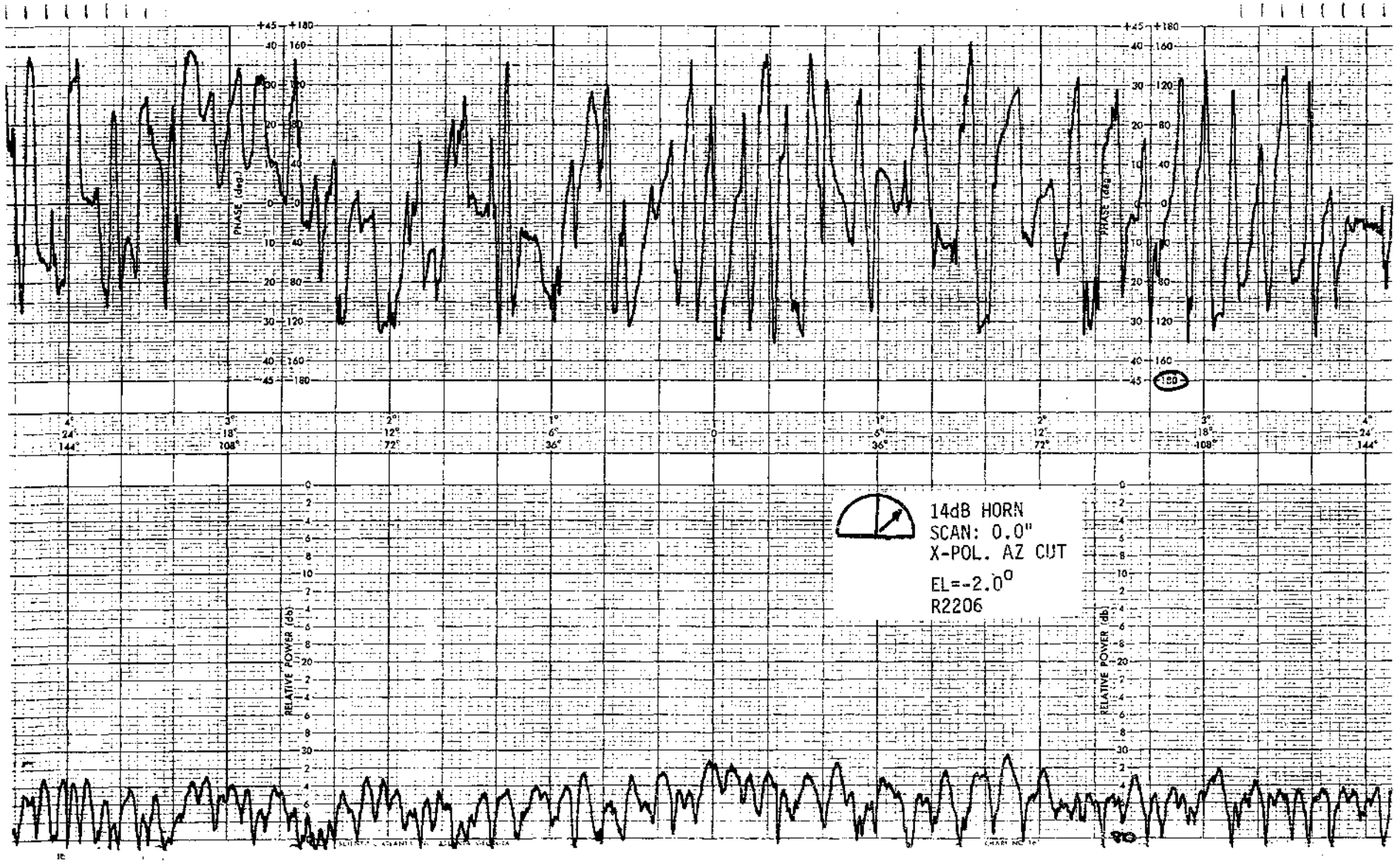

14dB HORN
SCAN: 0.0°
X-POL. AZ CUT
EL=+3.0°
R2201
RELATIVE POWER (dB)
PHASE (deg)

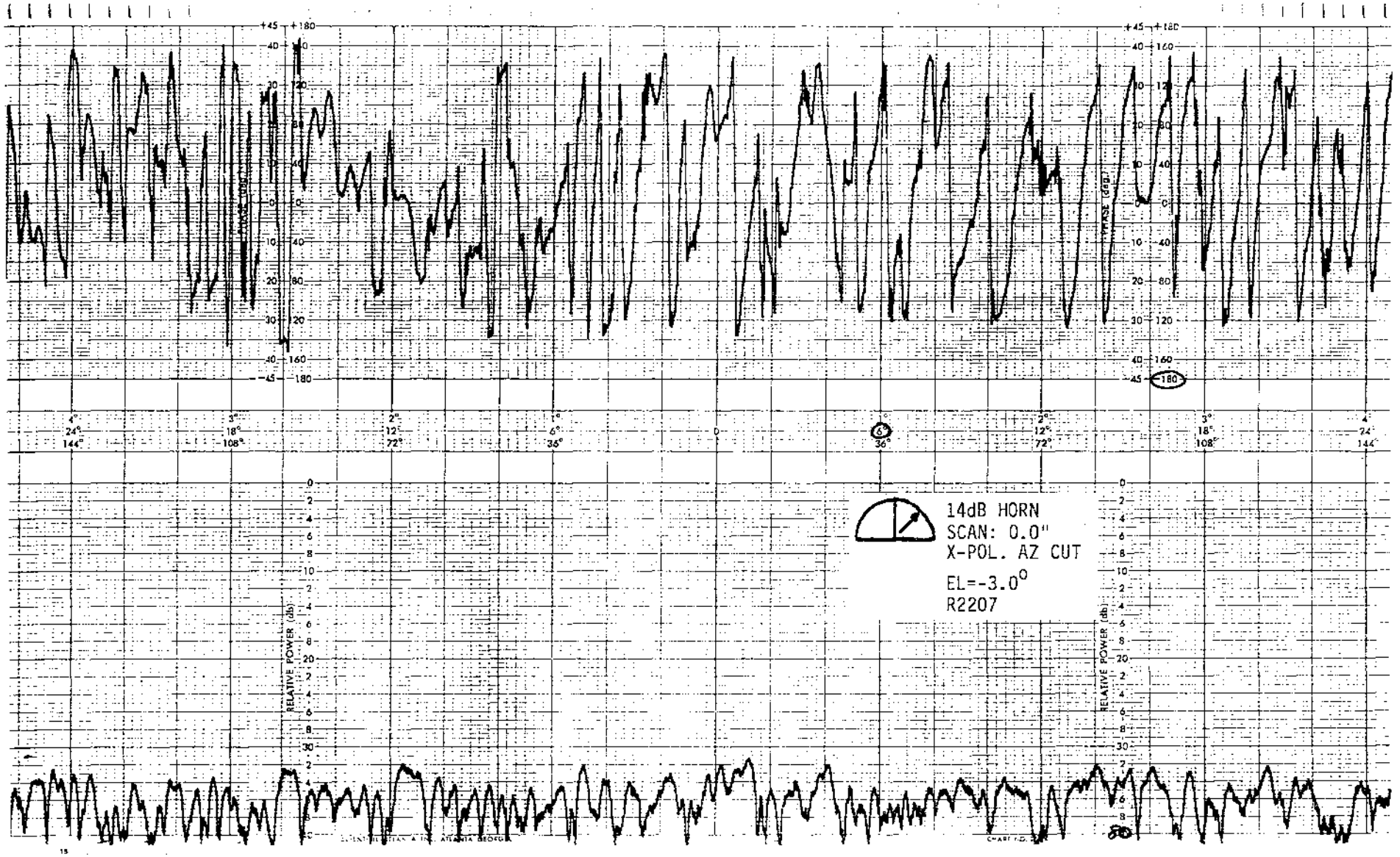

14dB HORN
SCAN: 0.0°
X-POL. AZ CUT
EL=+2.0°
R2202
PHASE (deg)
RELATIVE POWER (db)

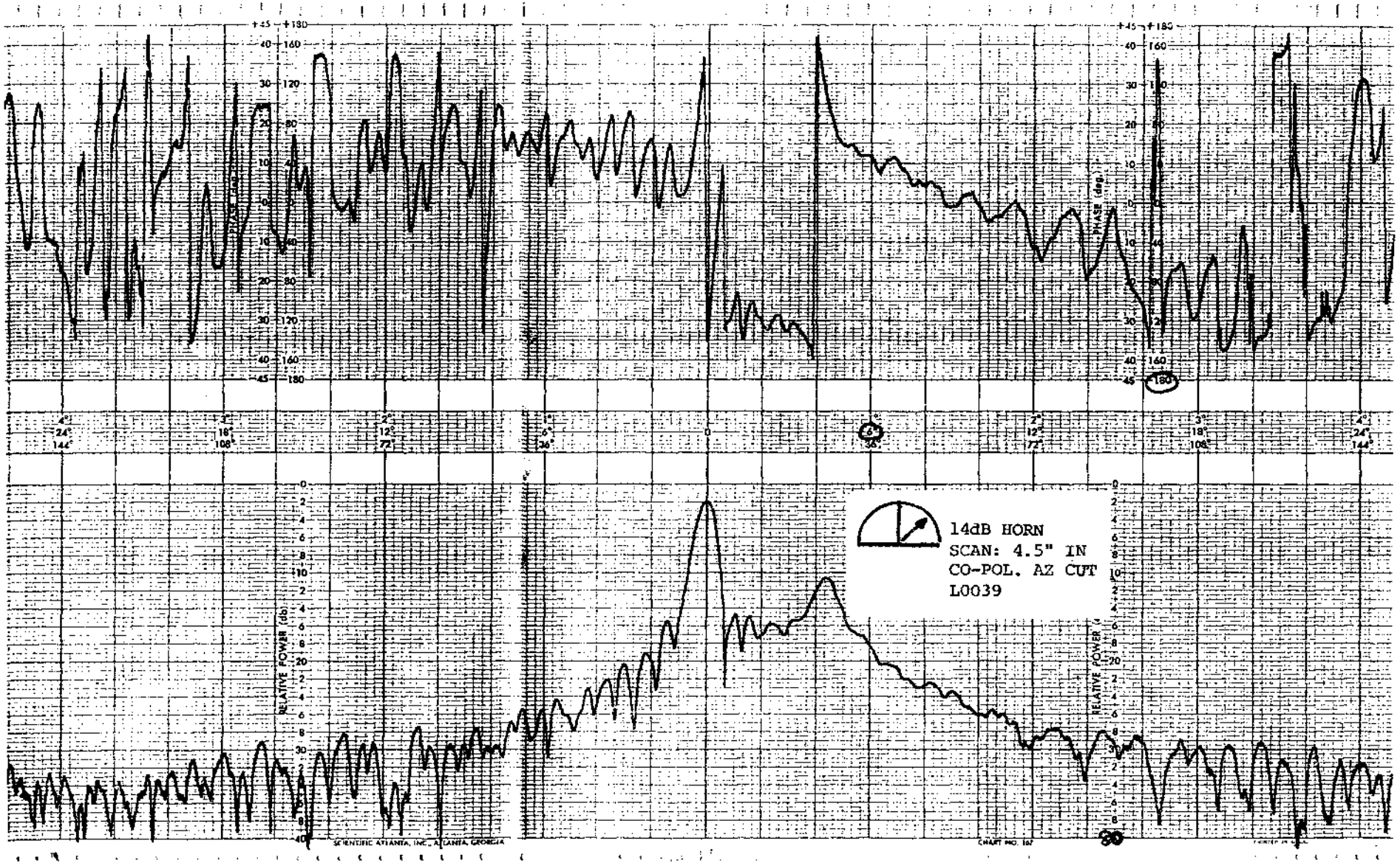

14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=+1.0°
R2203
PHASE (deg.)
RELATIVE POWER (db)

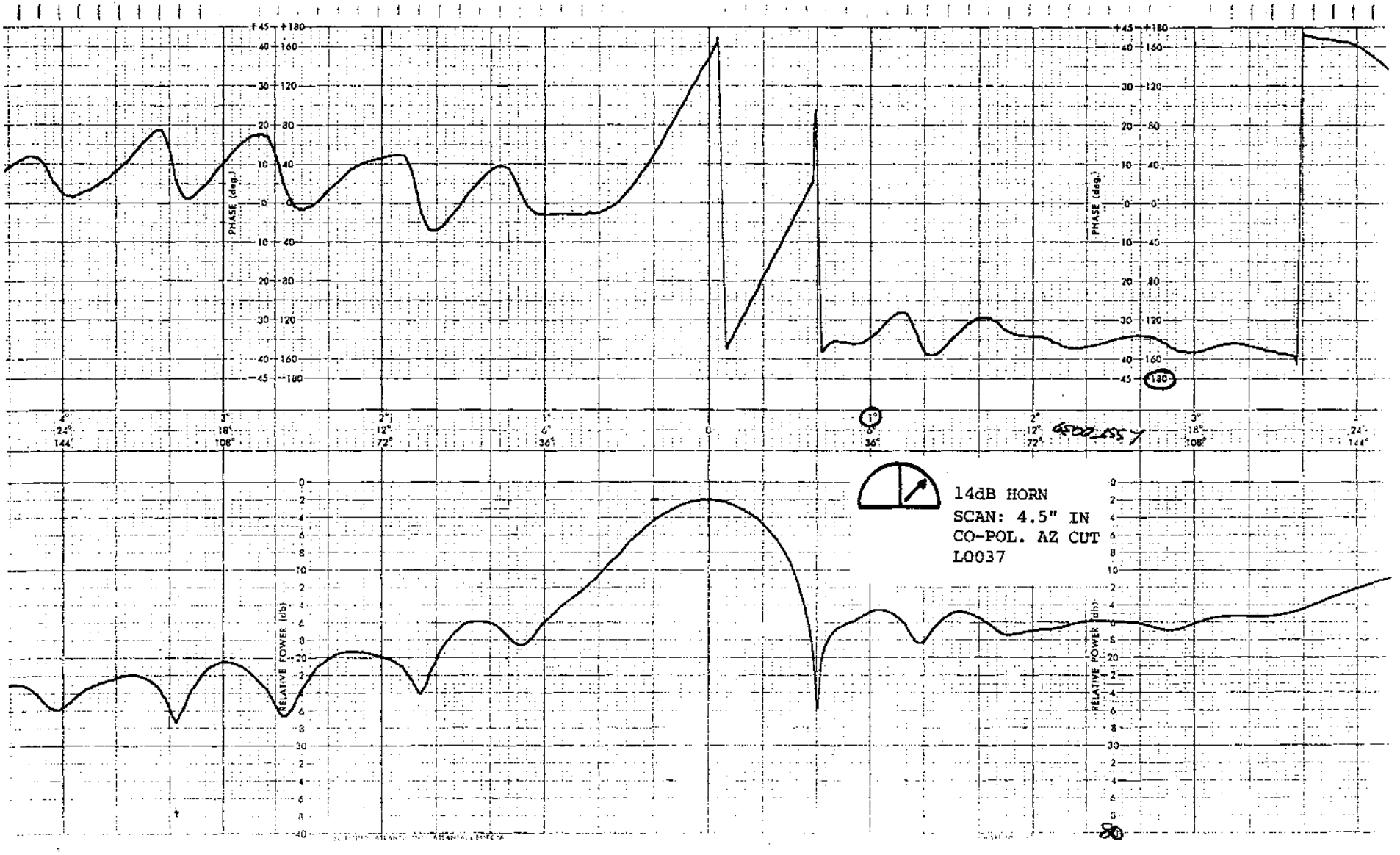

14dB HORN
SCAN: 0.0°
X-POL. AZ CUT
EL=0.0°
R2204
RELATIVE POWER (db)
PHASE (deg)

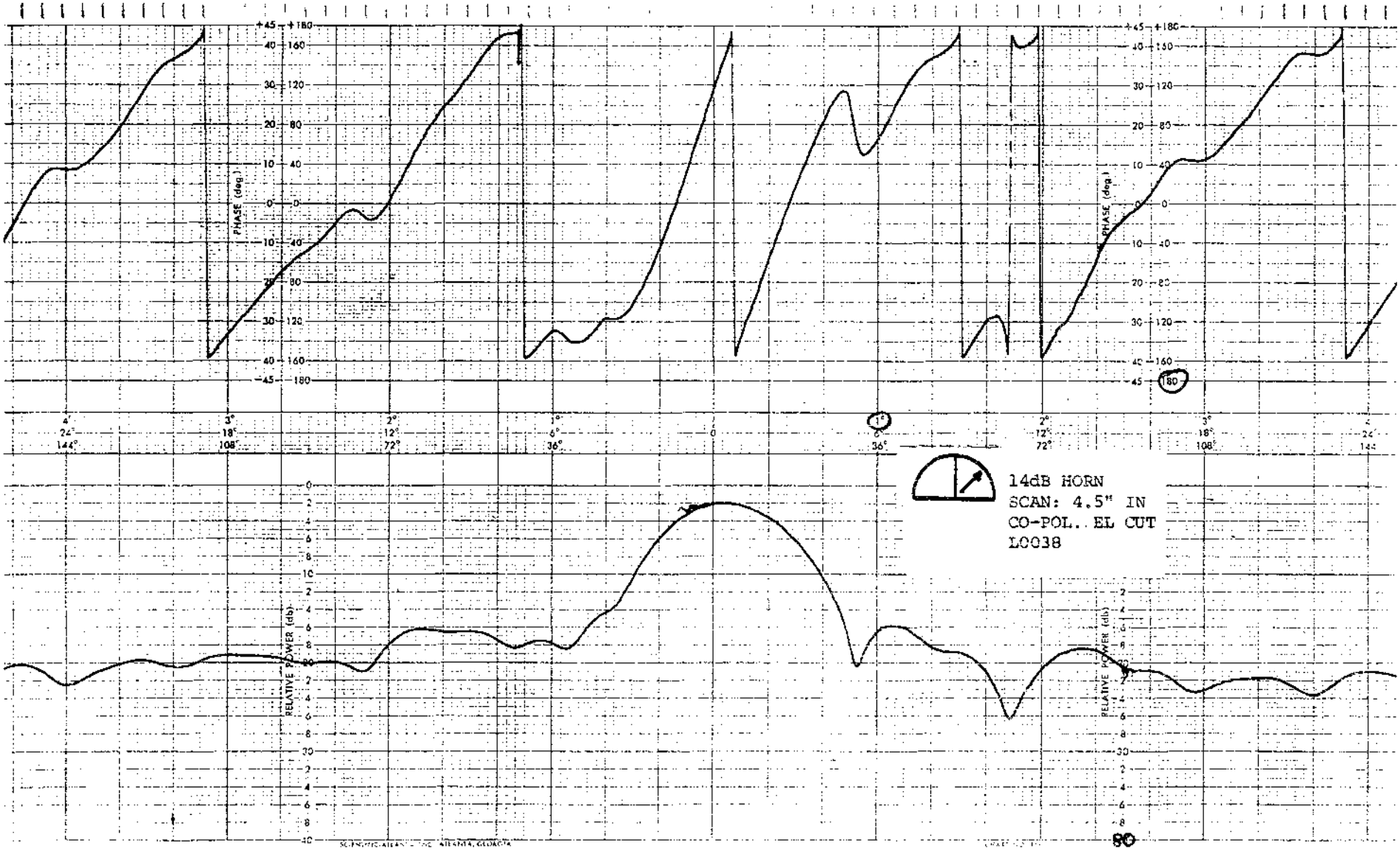

14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=-1.0°
R2205
PHASE (deg.)
RELATIVE POWER (db)

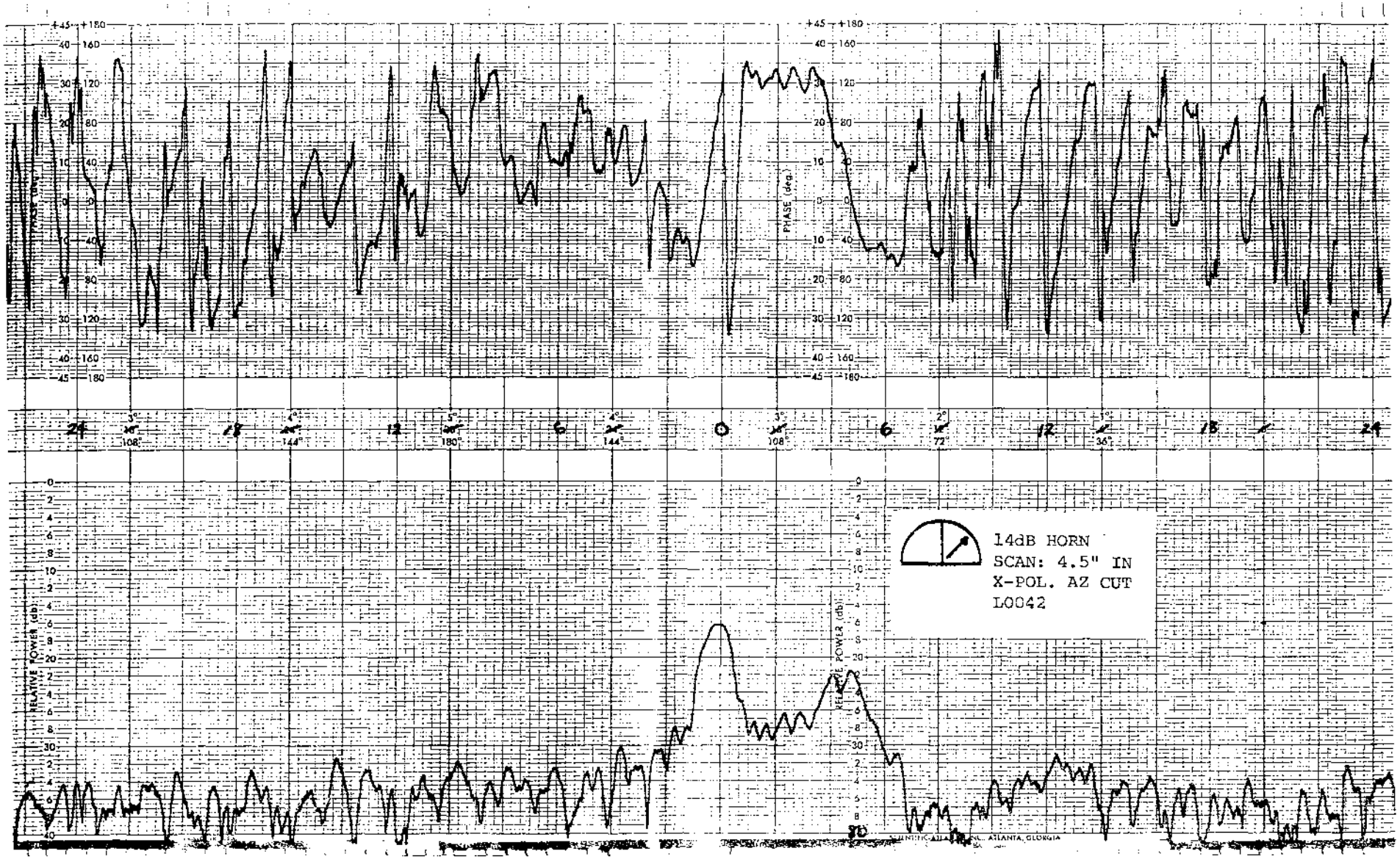

14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=-2.0°
R2206
PHASE (deg)
RELATIVE POWER (db)

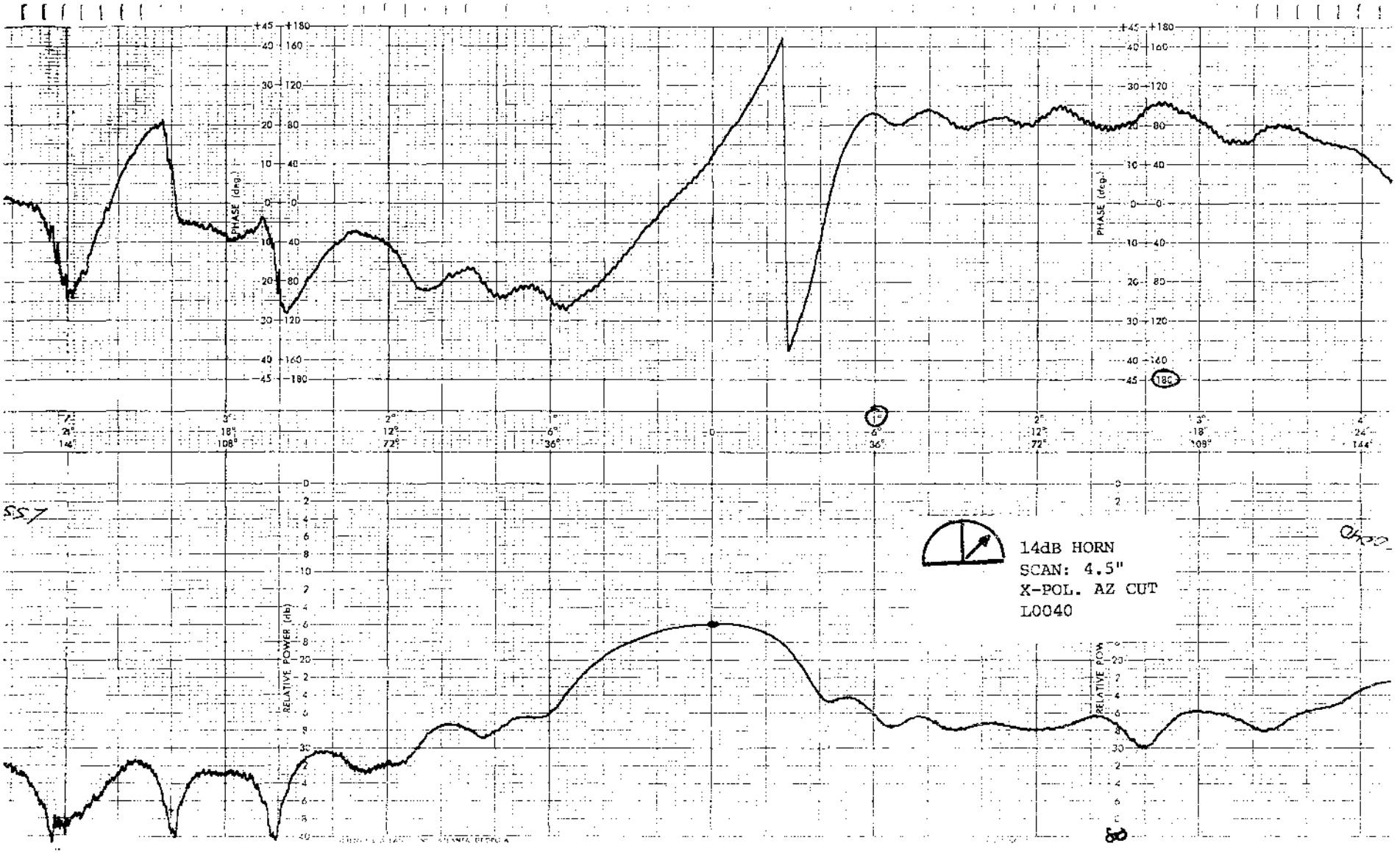

14dB HORN
SCAN: 0.0°
X-POL. AZ CUT
EL=-3.0°
R2207
RELATIVE POWER (db)
PHASE (deg.)

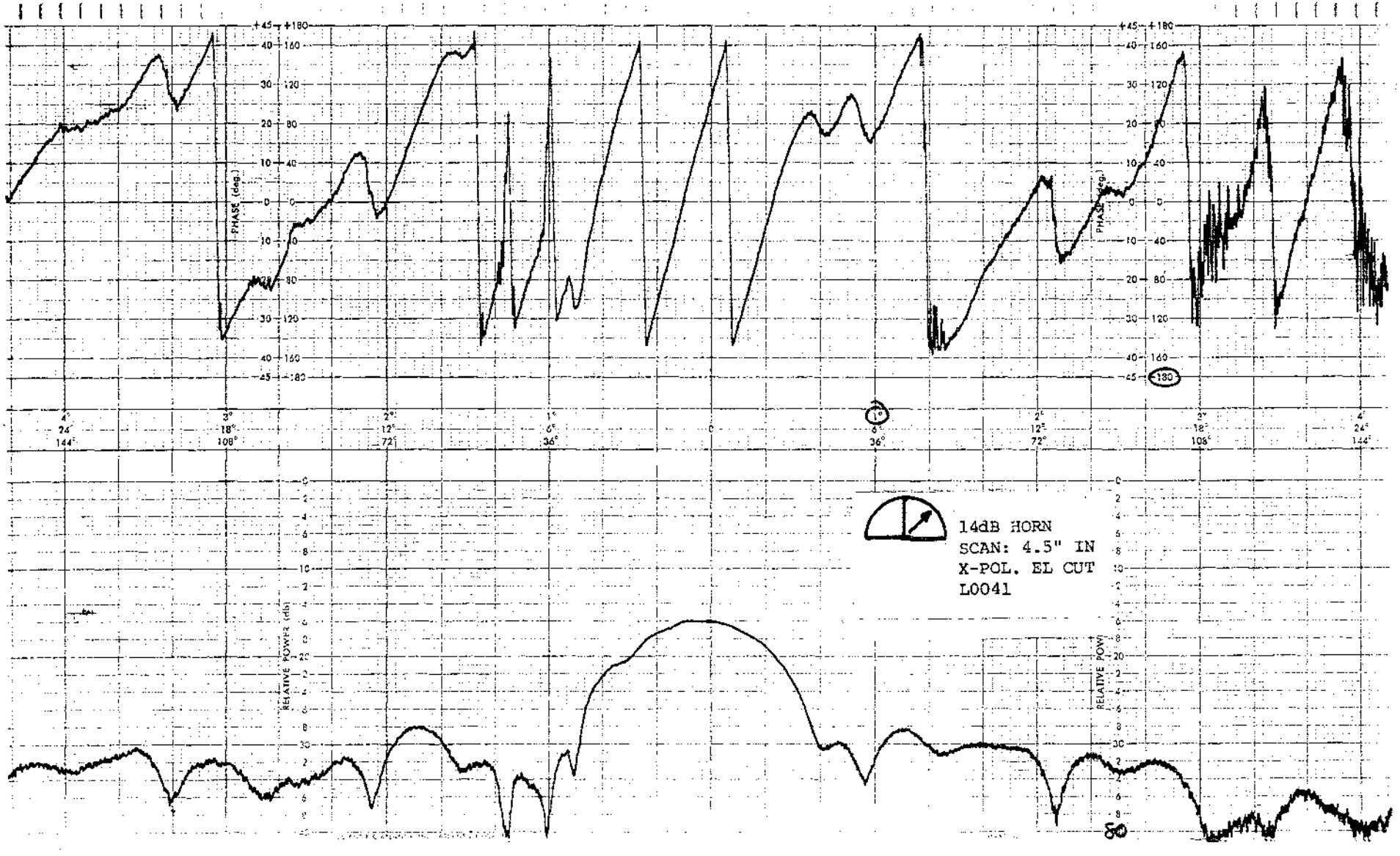

14dB HORN
SCAN: 4.5" IN
CO-POL. AZ CUT
L0039
RELATIVE POWER (db)
PHASE (deg.)
SCIENTIFIC ATLANTA, INC., ATLANTA, GEORGIA

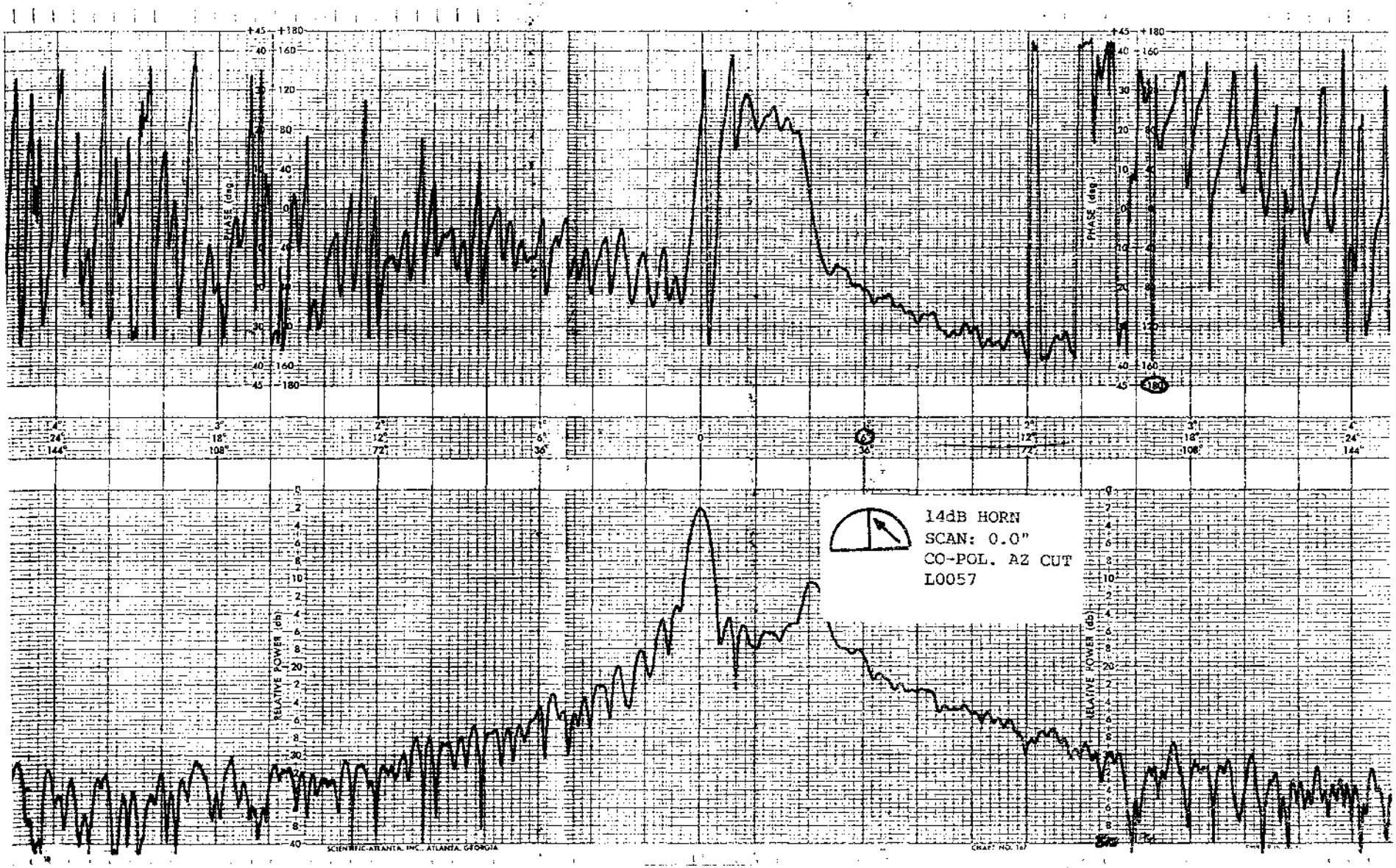

PHASE (deg.)
+45 +180
40 160
30 120
20 80
10 40
0 0
10 40
20 80
30 120
40 160
-45 -180
4°
24°
144°
3°
18°
108°
2°
12°
72°
1°
6°
36°
0
1°
6°
36°
2°
12°
72°
3°
18°
108°
4°
24°
144°
RELATIVE POWER (db)
0
2
4
6
8
10
20
30
40
14dB HORN
SCAN: 4.5" IN
CO-POL. AZ CUT
L0037

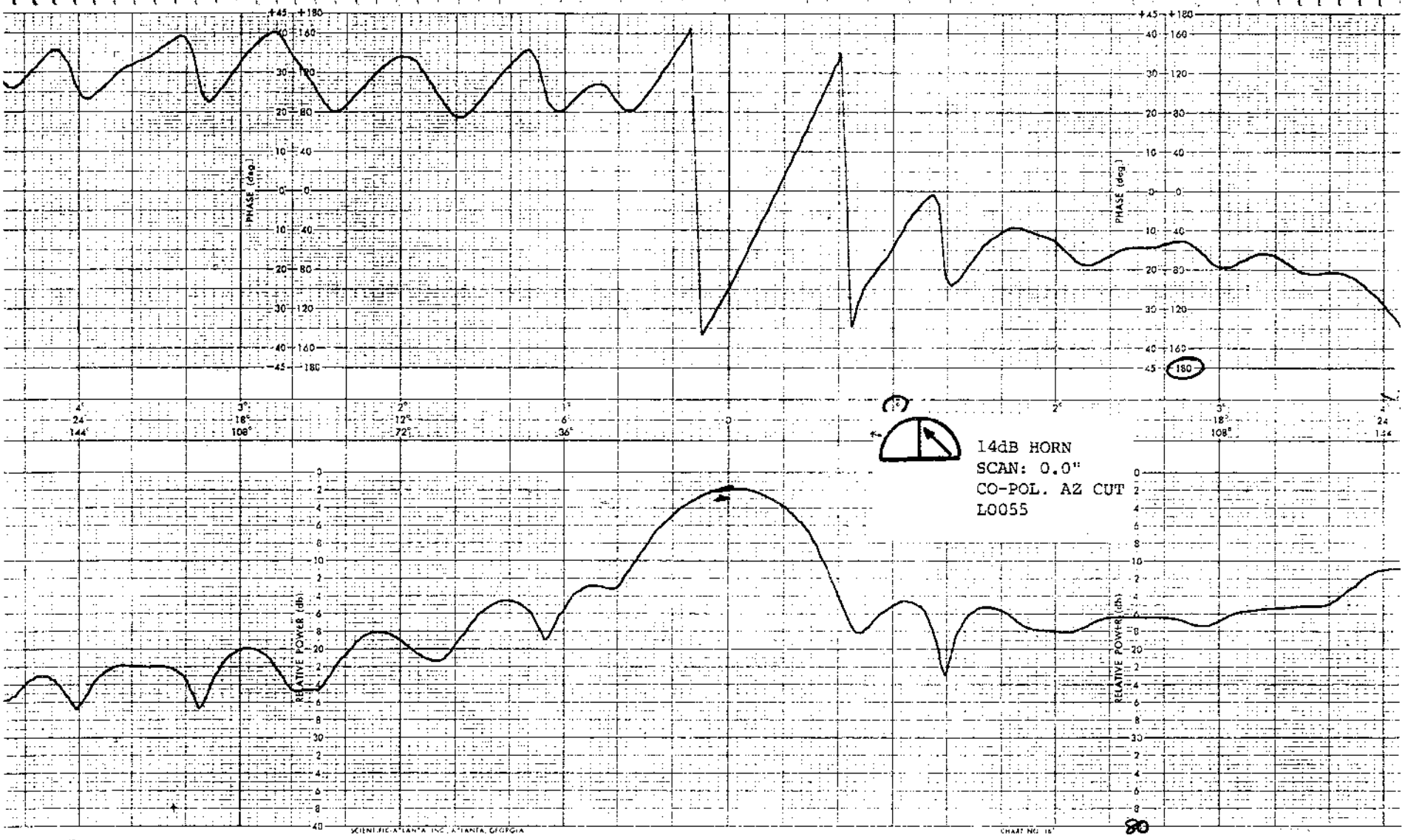

PHASE (deg.)
RELATIVE POWER (db)
14dB HORN
SCAN: 4.5" IN
CO-POL.. EL CUT
L0038

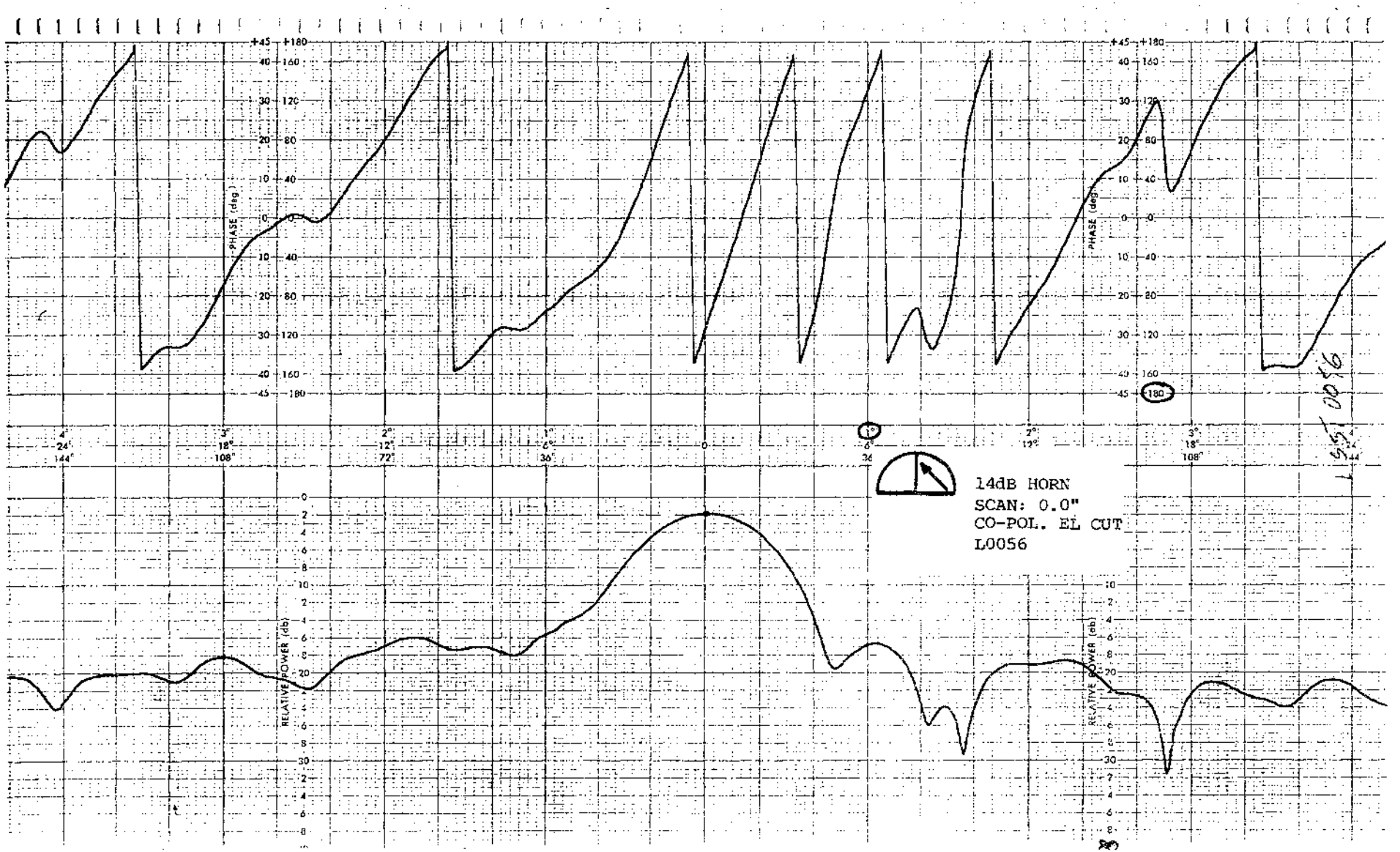

PHASE (deg)
RELATIVE POWER (db)
14dB HORN
SCAN: 4.5" IN
X-POL. AZ CUT
L0042

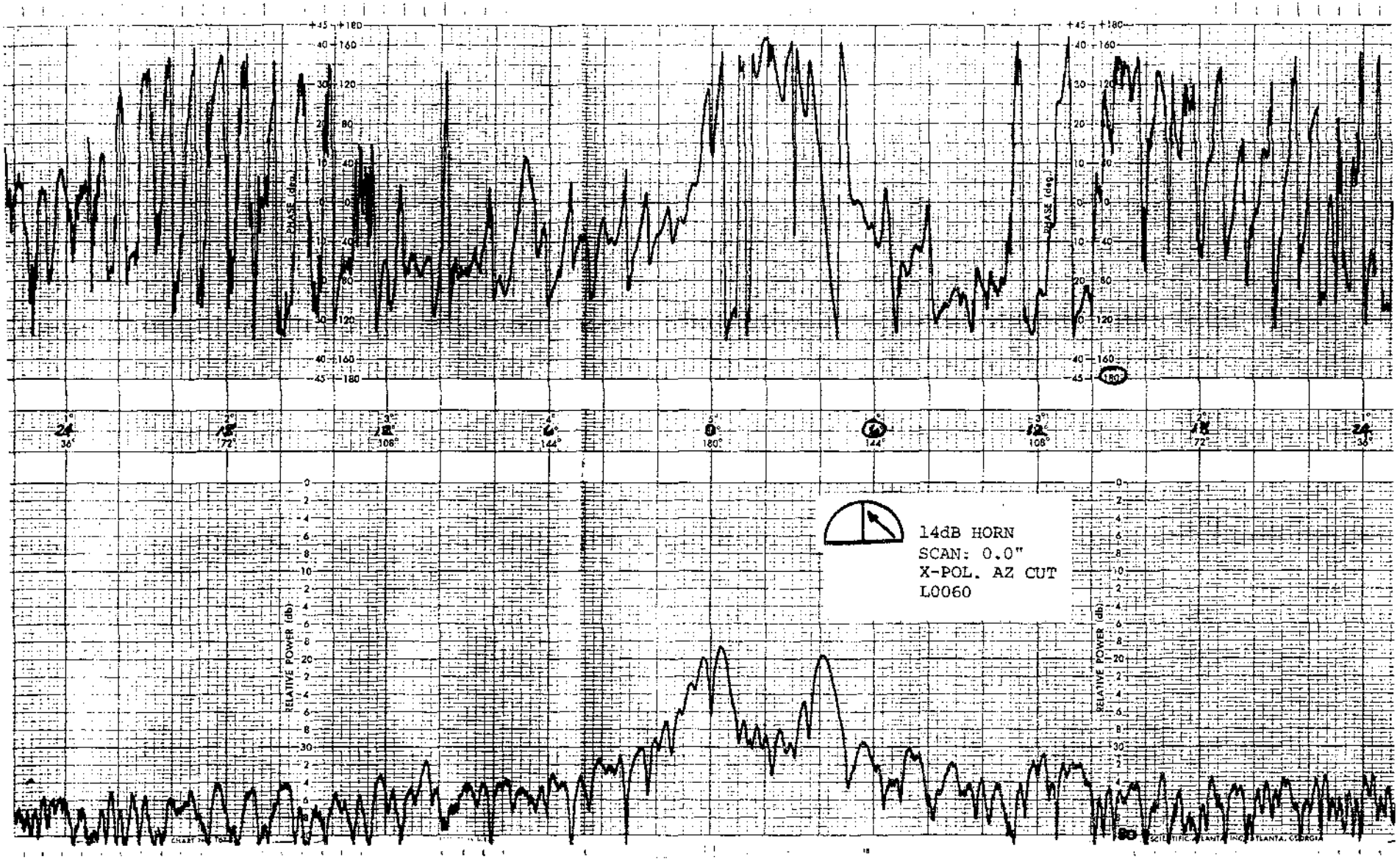

PHASE (deg.)
RELATIVE POWER (db)
14dB HORN
SCAN: 4.5"
X-POL. AZ CUT
L0040

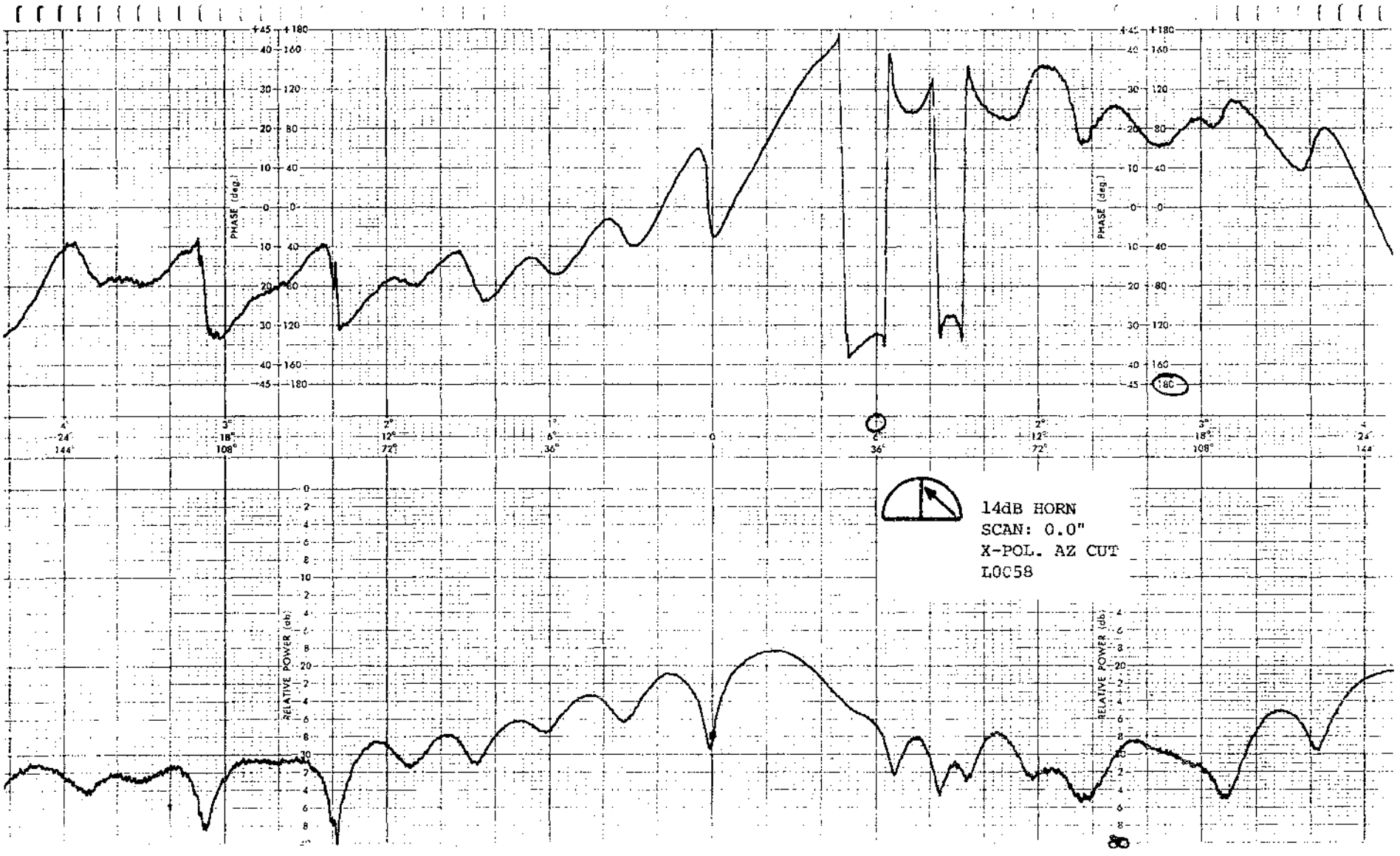

PHASE (deg.)
RELATIVE POWER (db)
14dB HORN
SCAN: 4.5" IN
X-POL. EL CUT
L0041

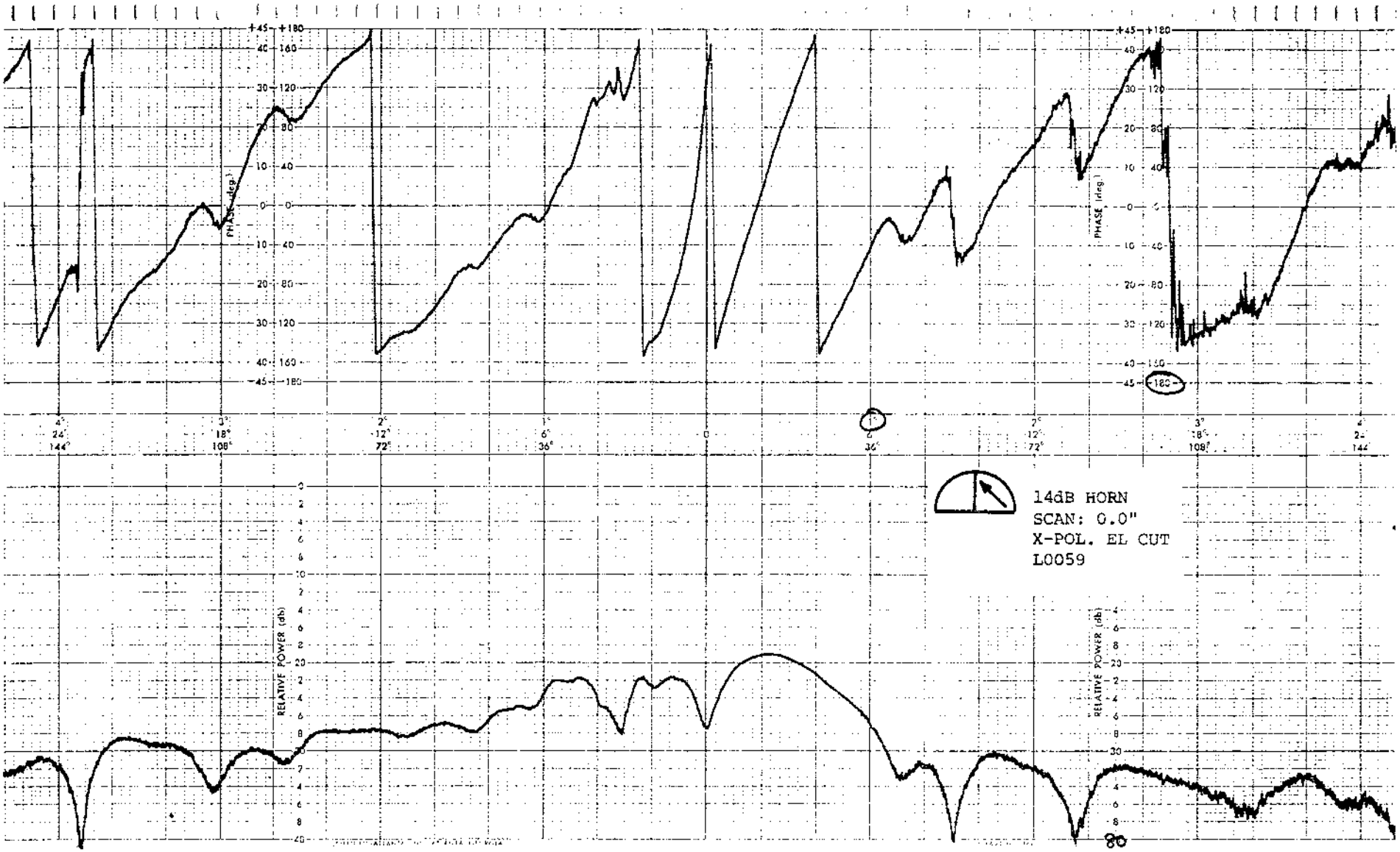

14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
L0057
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA


PHASE (deg.)
+45 +180
40 160
30 120
20 80
10 40
0 0
10 40
20 80
30 120
40 160
45 180
4°
24
144°
3°
18°
108°
2°
12°
72°
1°
6°
36°
0
2°
3°
18°
108°
4°
24
144°
14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
L0055
RELATIVE POWER (db)
0
2
4
6
8
10
20
30
40
SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA
CHART NO. 18"
80


PHASE (deg)
RELATIVE POWER (db)
14dB HORN
SCAN: 0.0"
CO-POL. EL CUT
L0056


14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
L0060
PHASE (deg.)
RELATIVE POWER (db)

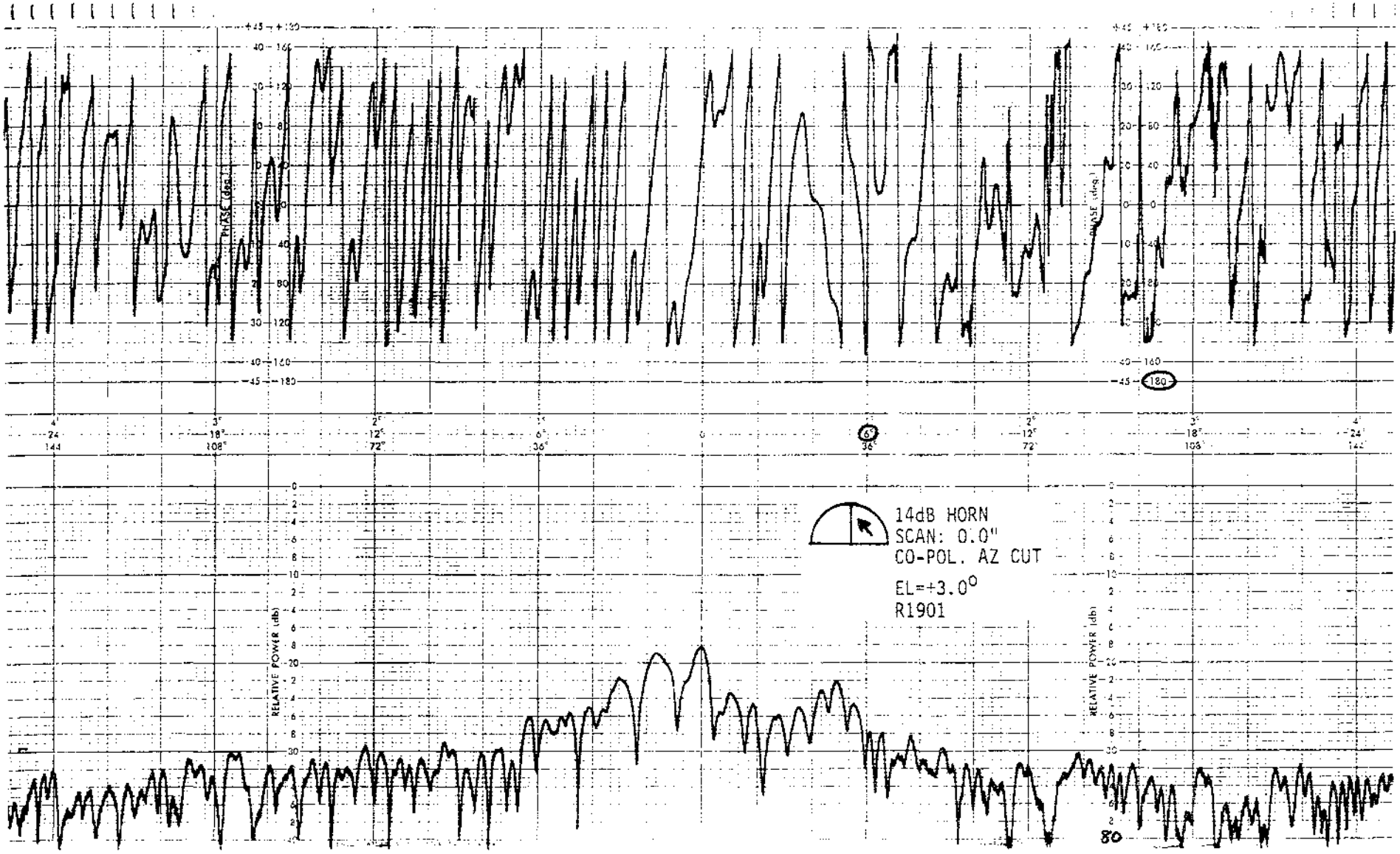

PHASE (deg.)
RELATIVE POWER (db)
14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
L0C58

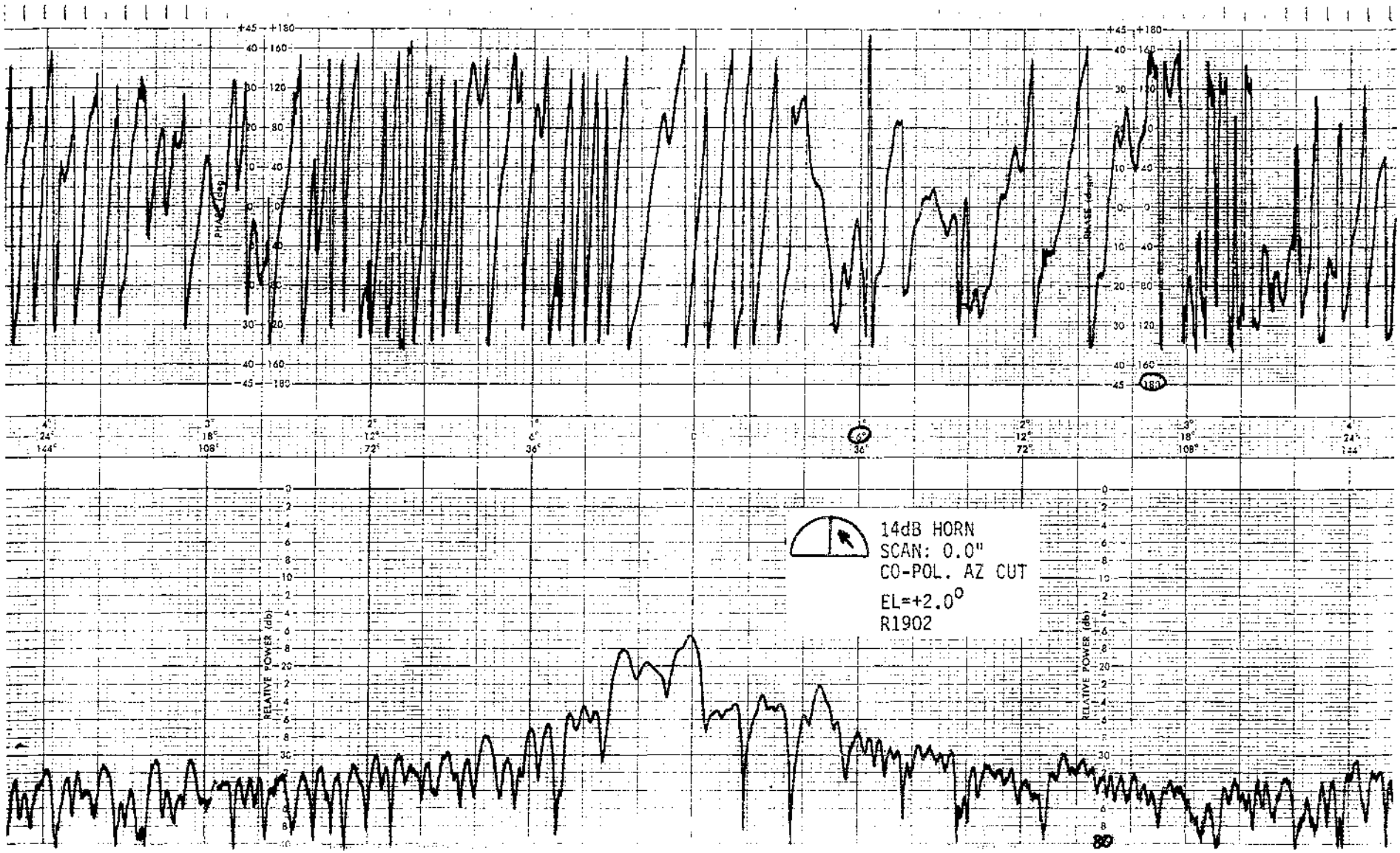

PHASE (deg.)
RELATIVE POWER (db)
14dB HORN
SCAN: 0.0"
X-POL. EL CUT
L0059

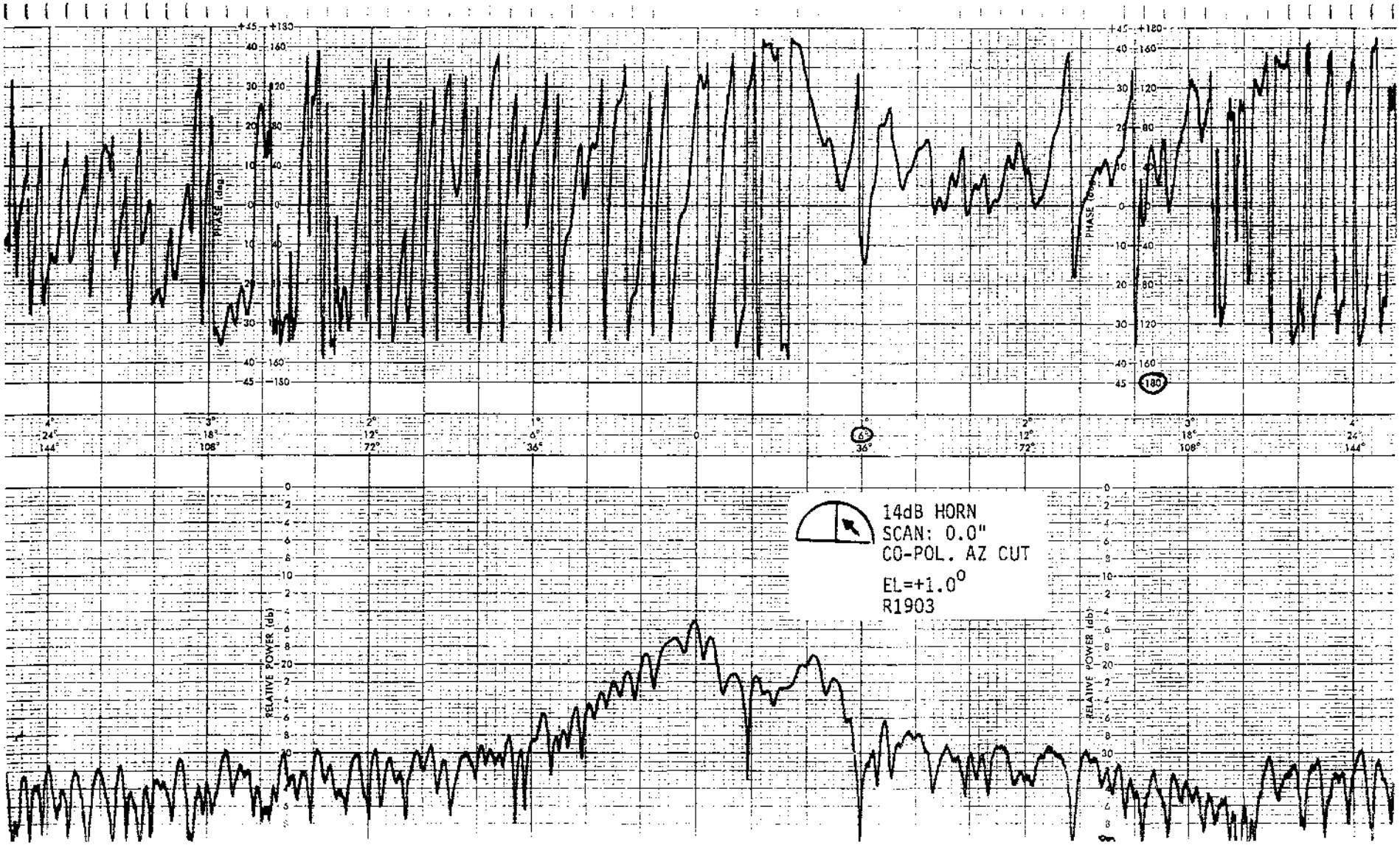
LSST - IX

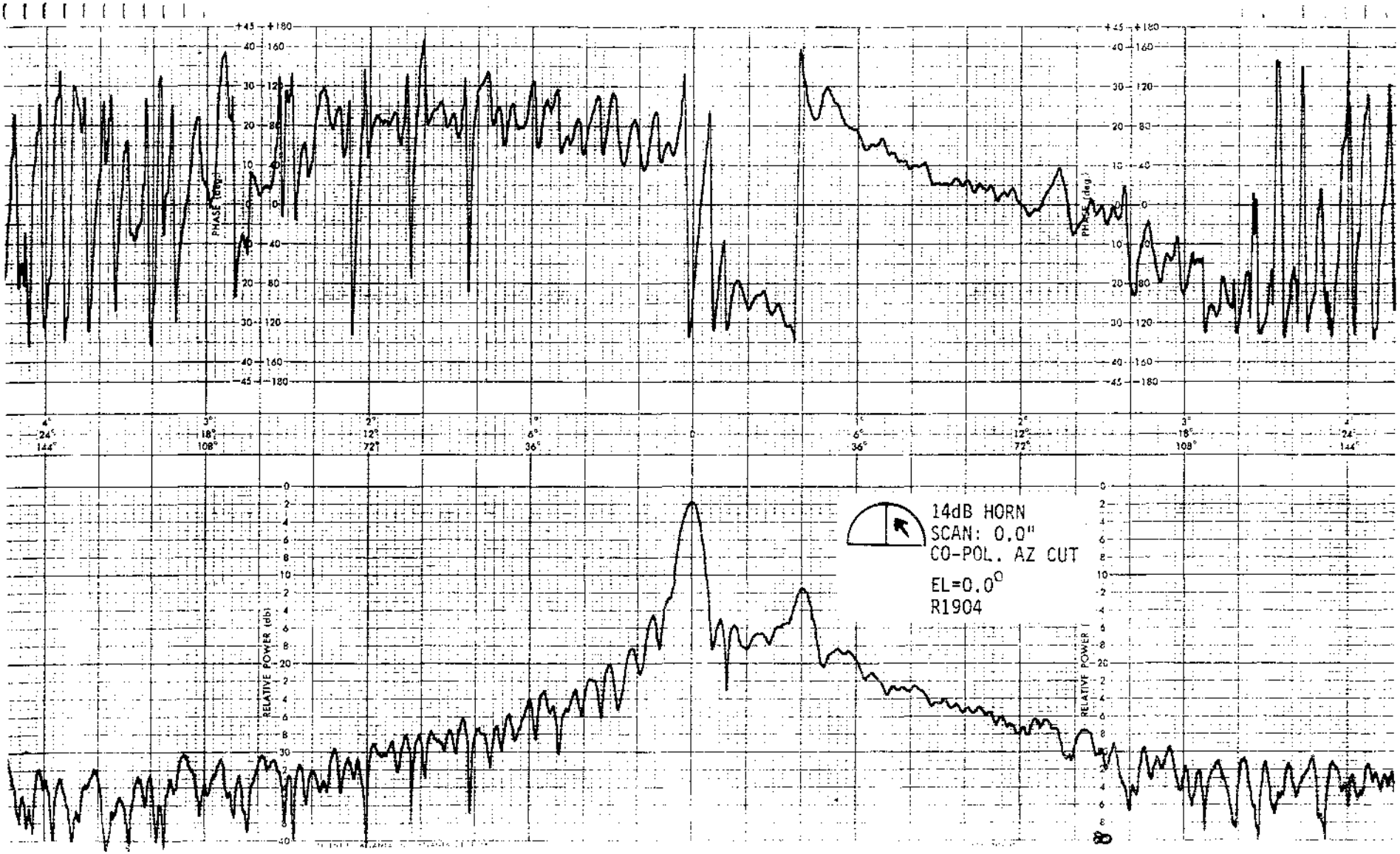
SECONDARY PATTERN LOG

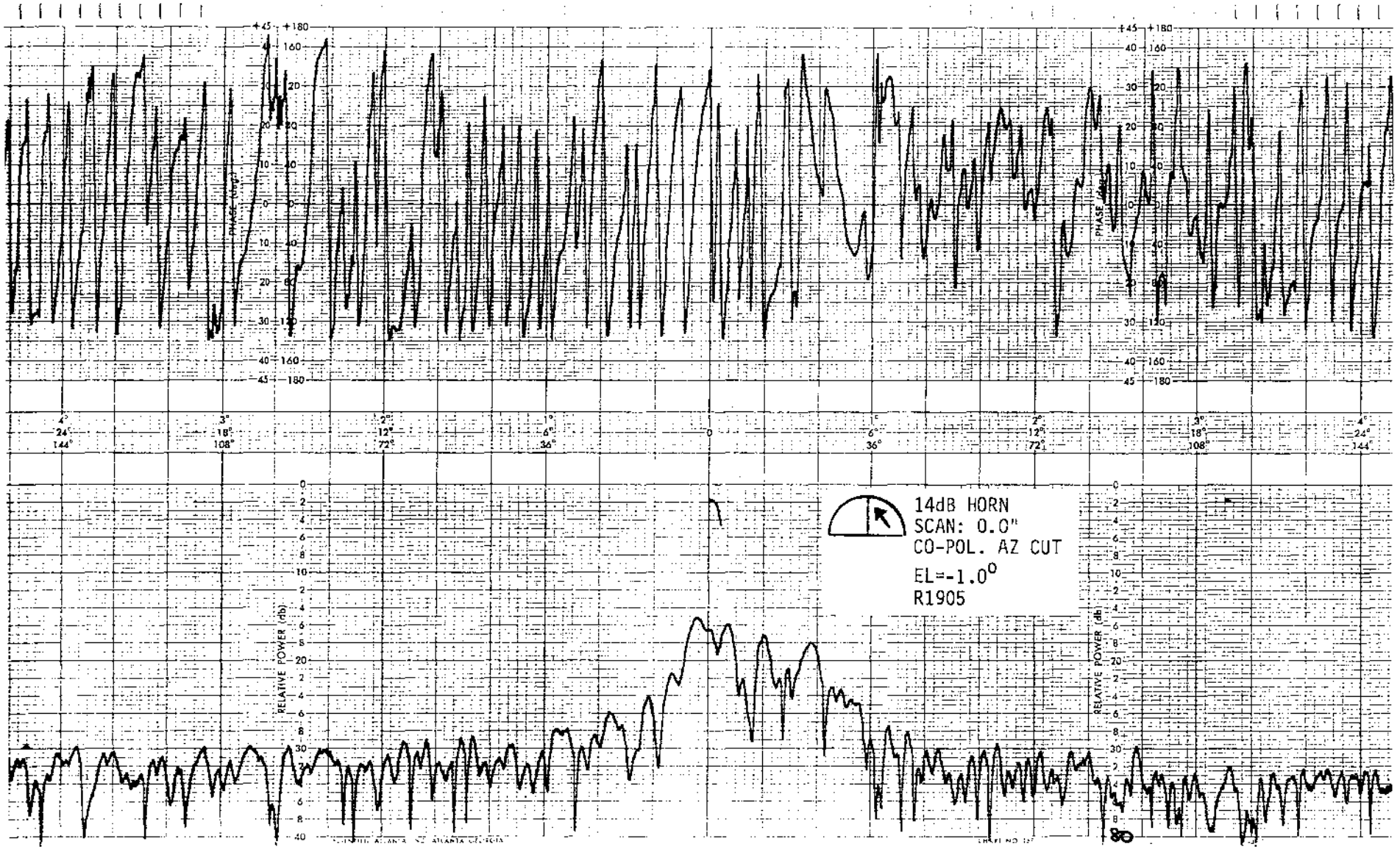
CONFIGURATION	HORN	SCAN	POL.	PK. GAIN	PATTERN	FILE NAME	PAGE NUMBER
	14 dB	0.0"	CO	-	$+3^{\circ}$EL $\pm$ 45° AZ	R1901	279
	"	"	"	-	$+2^{\circ}$EL "	R1902	280
	"	"	"	-	$+1^{\circ}$EL "	R1903	281
	"	"	"	50.55	0°EL "	R1904	282
	"	"	"	-	-1°EL "	R1905	283
	"	"	"	-	-2°EL "	R1906	284
	"	"	"	-	-3°EL "	R1907	285
	14 dB	0.0"	X	-	$+3^{\circ}$EL $\pm$ 45°AZ	R2001	286
	"	"	"	-	$+2^{\circ}$EL "	R2002	287
	"	"	"	-	$+1^{\circ}$EL "	R2003	288
	"	"	"	-	0°EL "	R2004	289
	"	"	"	-	-1°EL "	R2005	290
	"	"	"	-	-2°EL "	R2006	291
	"	"	"	-	-3°EL "	R2007	292
	14 dB	0.0"	CO	-	$+3^{\circ}$EL $\pm$$45^{\circ}$AZ	R2501	293
	"	"	"	-	$+2^{\circ}$EL "	R2502	294
	"	"	"	-	$+1^{\circ}$EL "	R2503	295
	"	"	"	50.35	0°EL "	R2504	296
	"	"	"	-	-1°EL "	R2505	297
	"	"	"	-	-2°EL "	R2506	298
	"	"	"	-	-3°EL "	R2507	299
	14 dB	0.0"	X	-	$+3^{\circ}$EL $\pm$ 45°AZ	R2601	300
	"	"	"	-	$+2^{\circ}$EL "	R2602	301
	"	"	"	-	$+1^{\circ}$EL "	R2603	302
	"	"	"	-	0°EL "	R2604	303
	"	"	"	-	-1°EL "	R2605	304
	"	"	"	-	-2°EL "	R2606	305
	"	"	"	-	-3°EL "	R2607	306

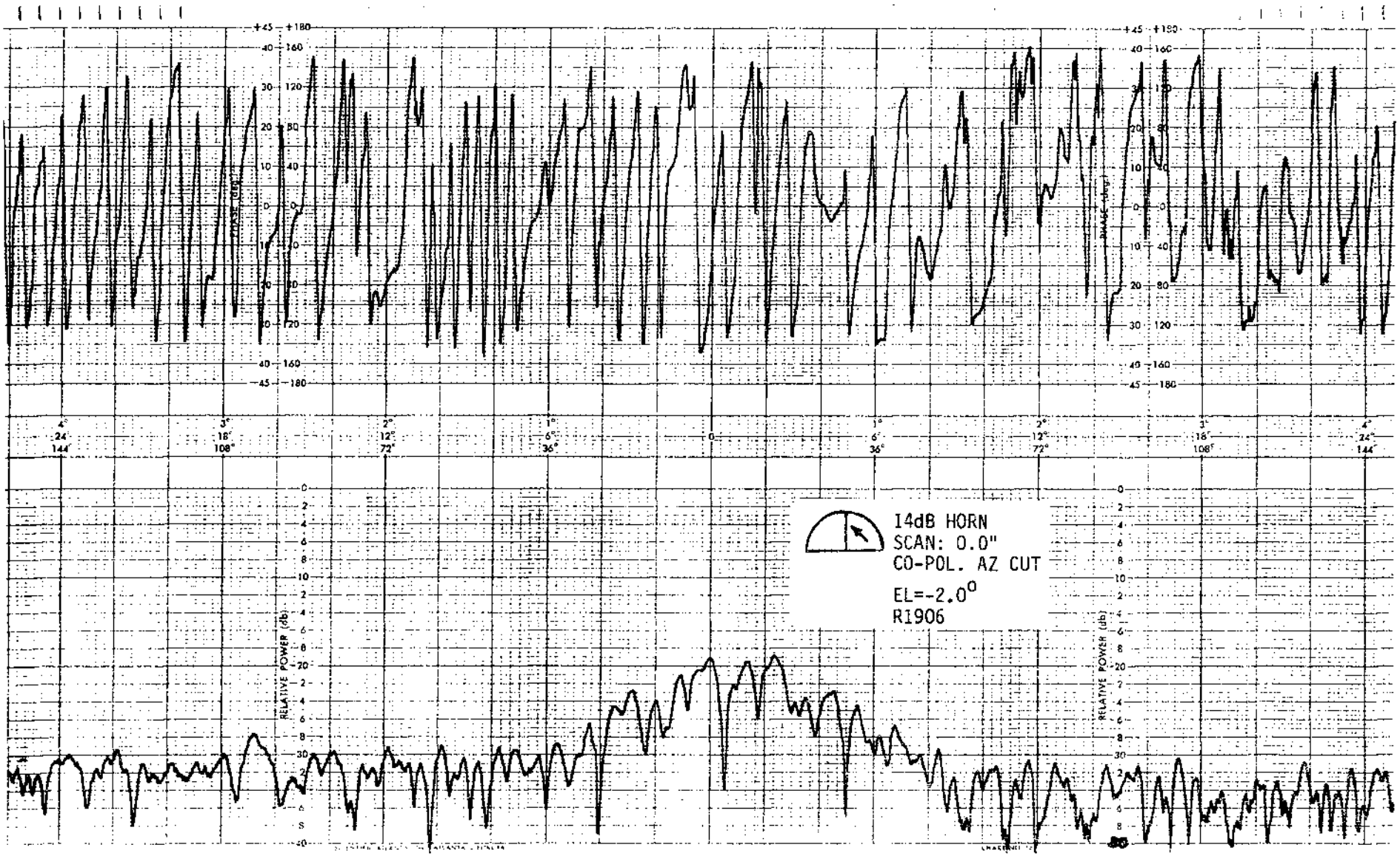

14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=+3.0°
R1901
RELATIVE POWER (db)
80

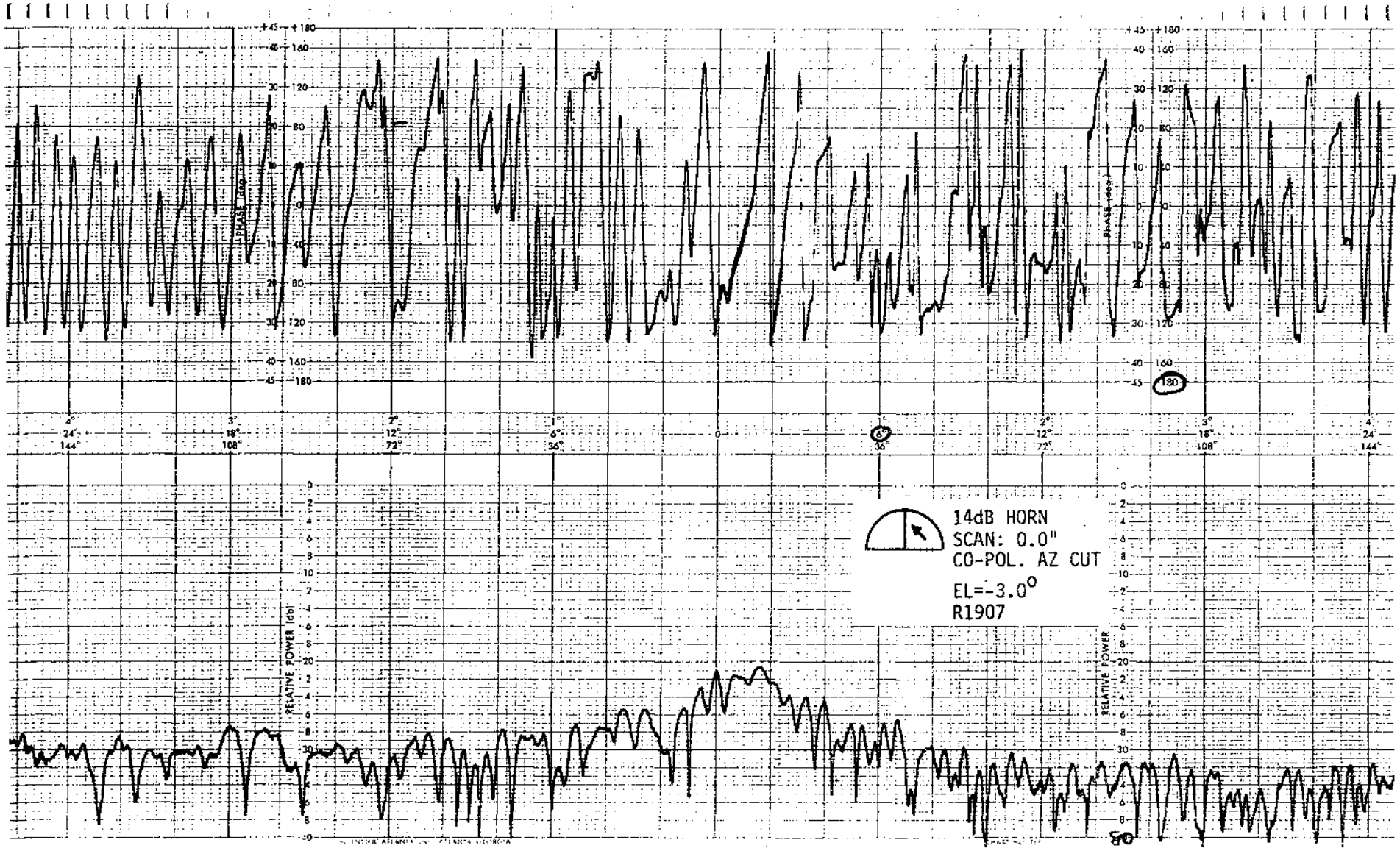

14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=+2.0°
R1902
PHASE (deg)
RELATIVE POWER (db)

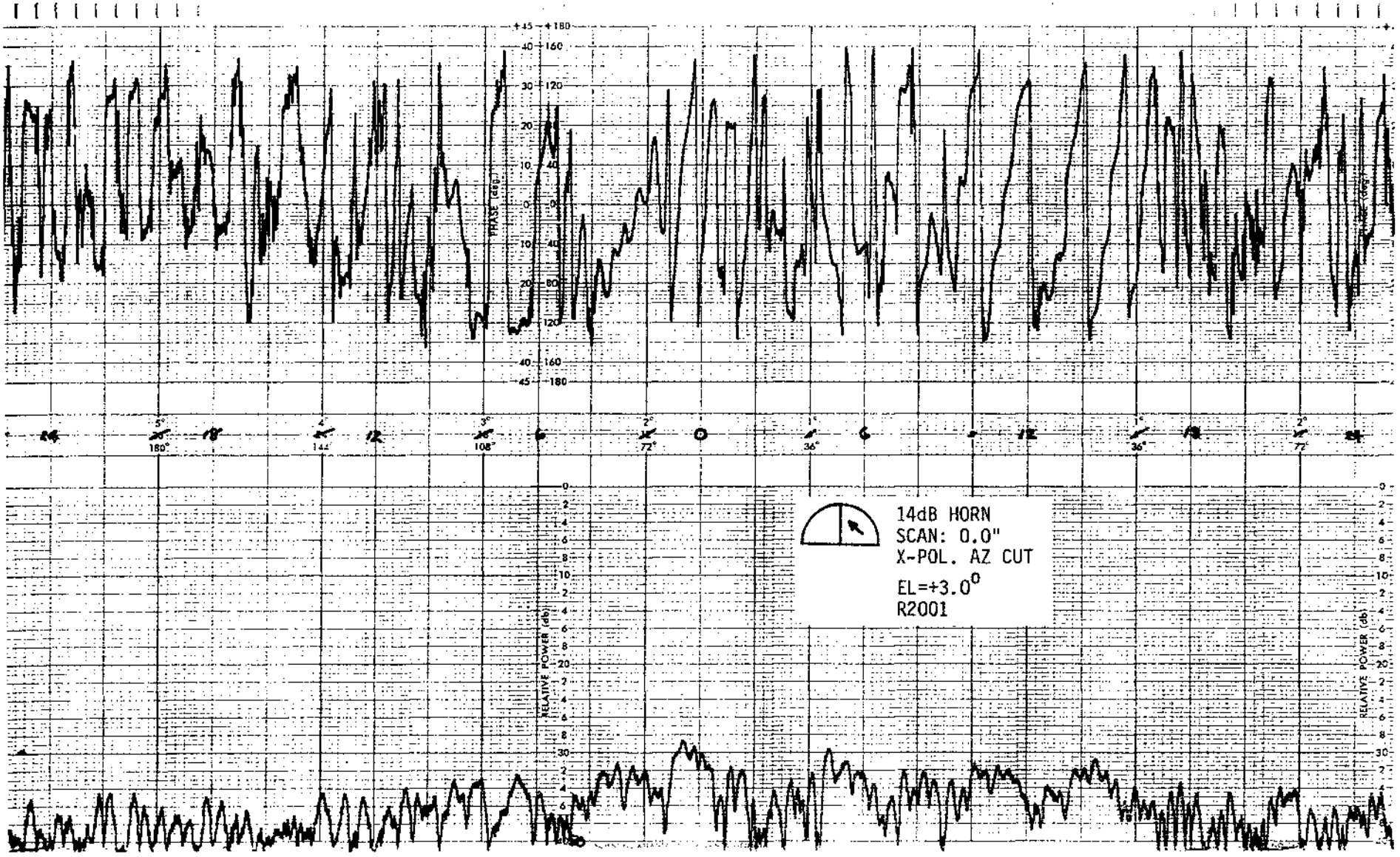

14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=+1.0°
R1903
PHASE (deg)
RELATIVE POWER (db)

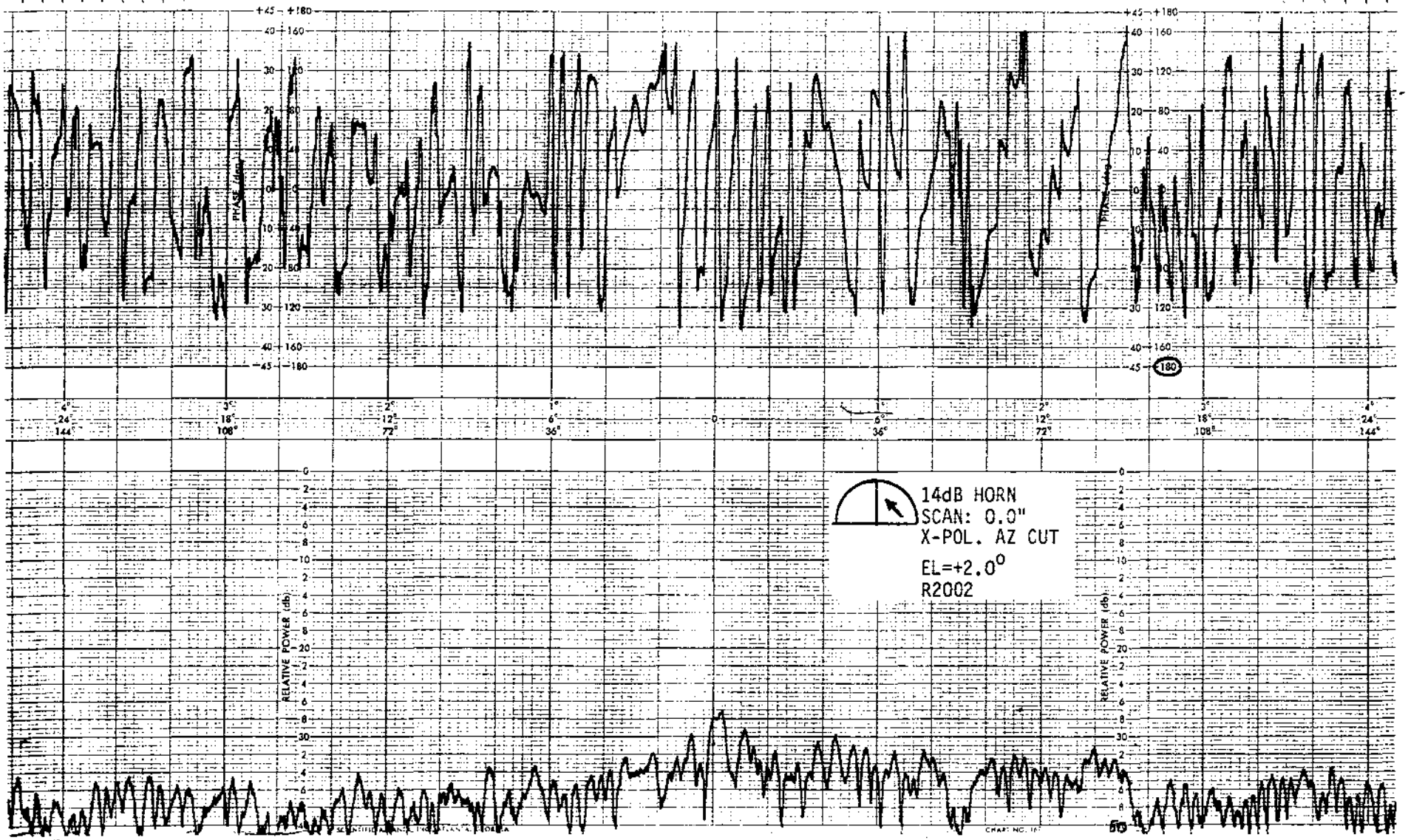

14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=0.0°
R1904
PHASE (deg.)
RELATIVE POWER (db)

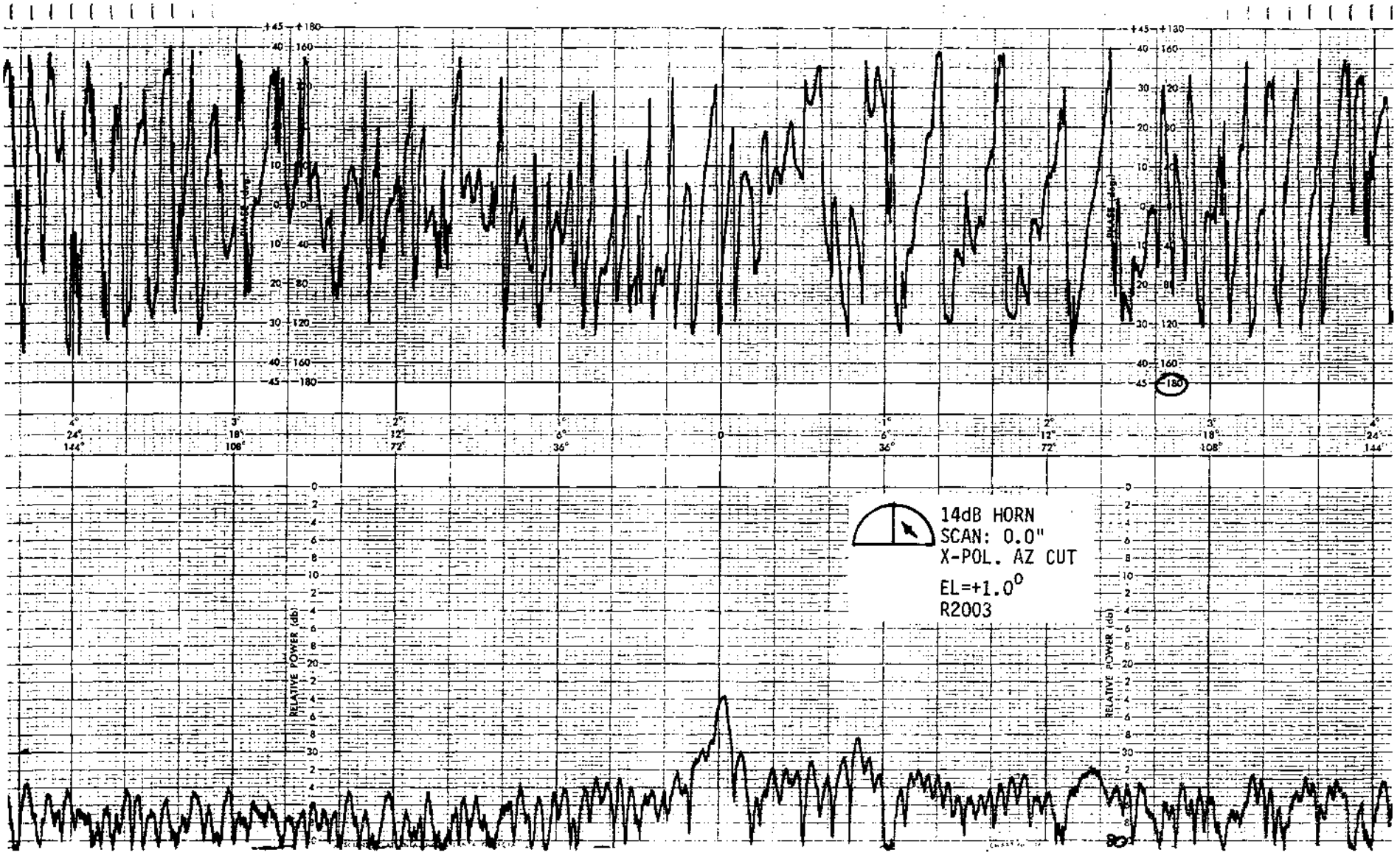

14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=-1.0°
R1905
PHASE (deg)
RELATIVE POWER (db)

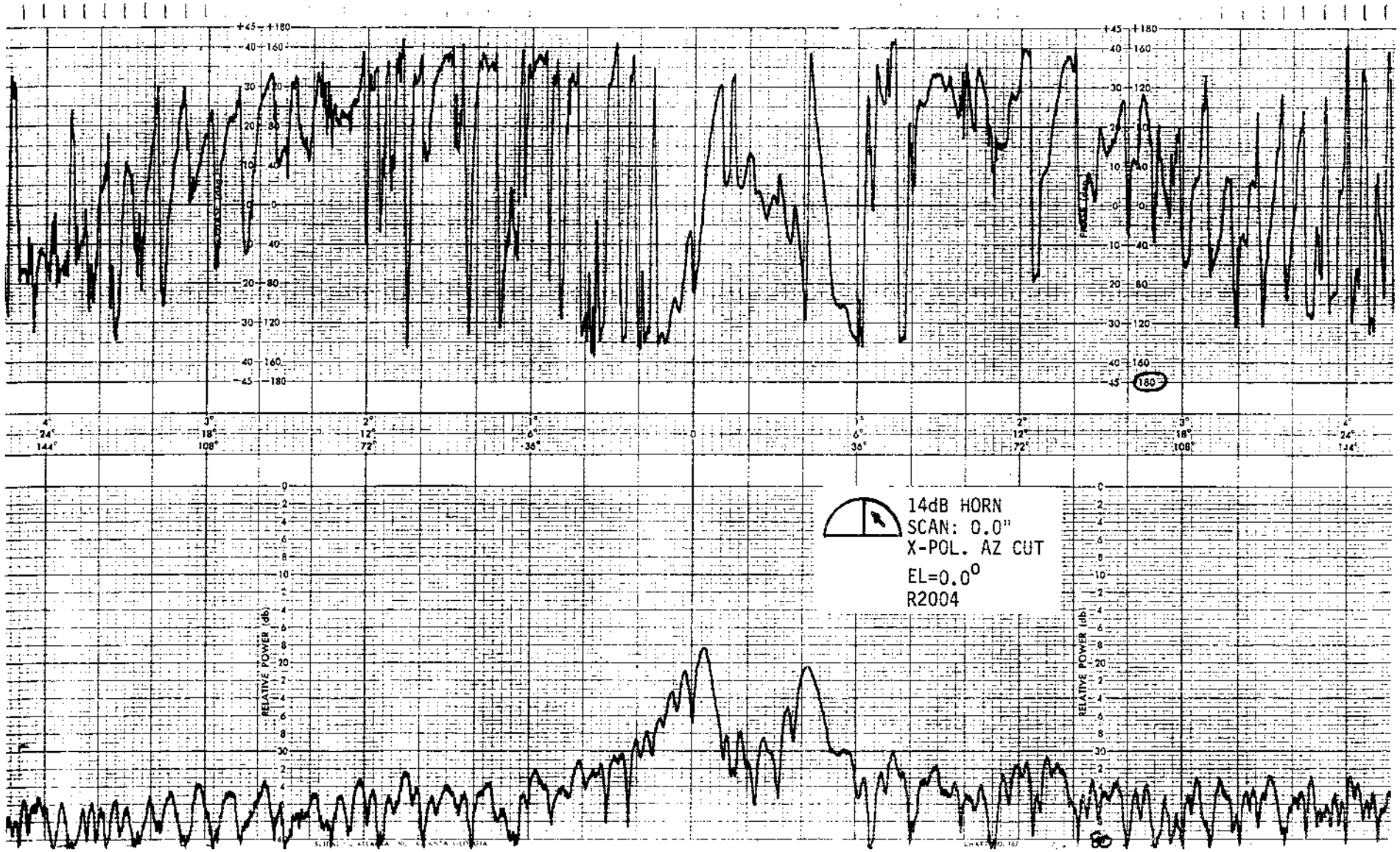

14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=-2.0°
R1906
RELATIVE POWER (db)

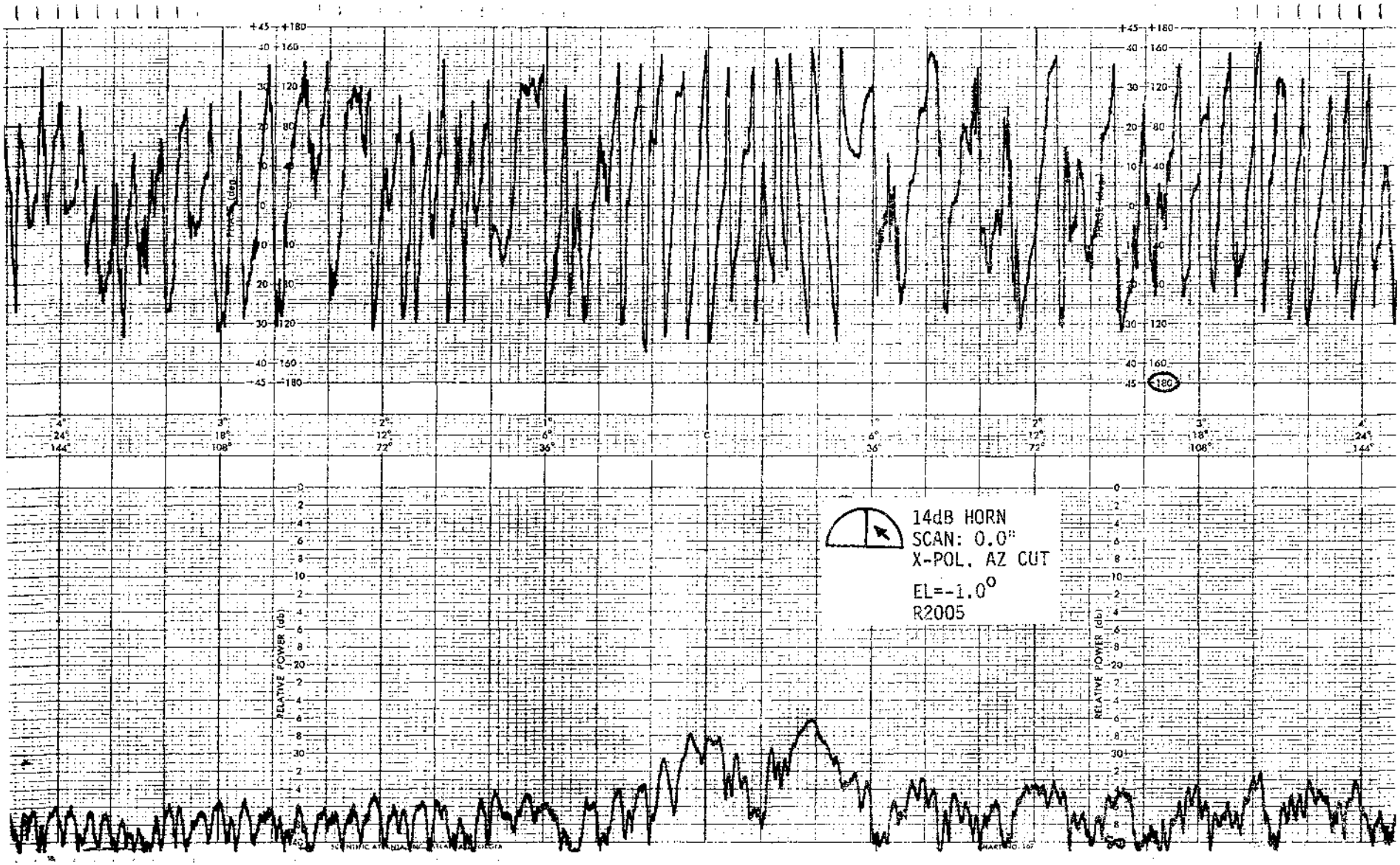

14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=-3.0°
R1907
RELATIVE POWER (db)
PHASE (deg)

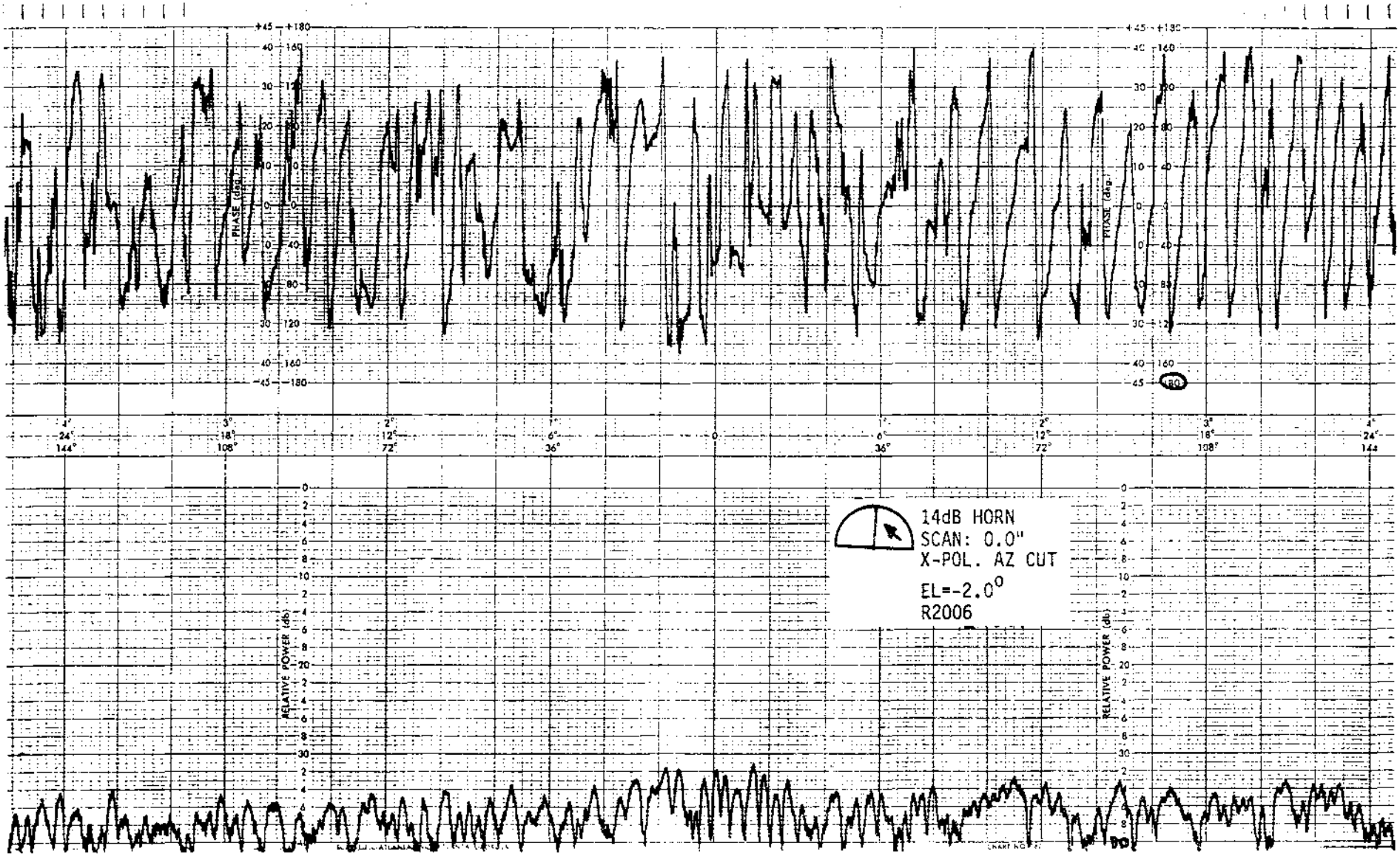

14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=+3.0°
R2001
PHASE (deg)
RELATIVE POWER (db)

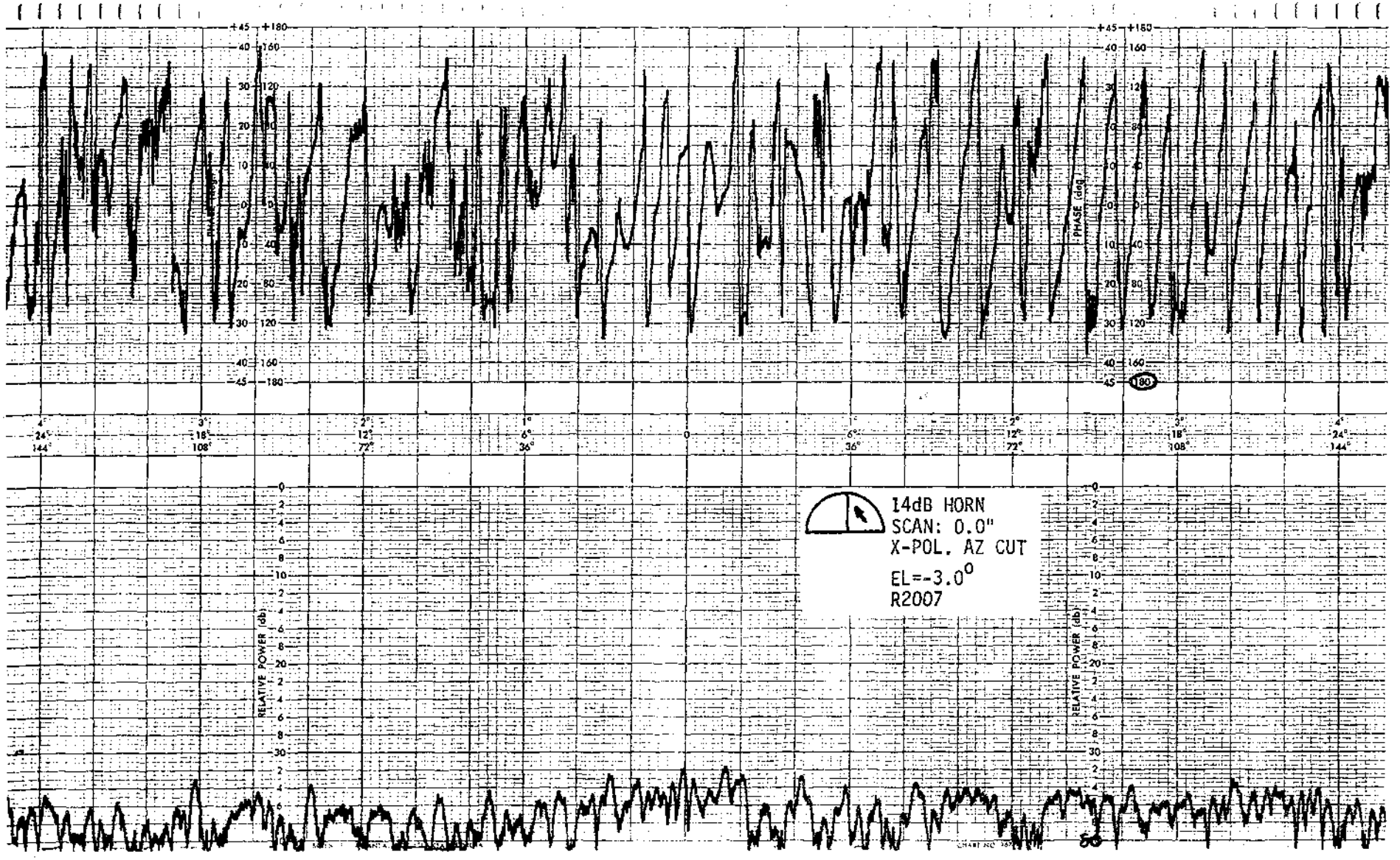

14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=+2.0°
R2002
PHASE (deg)
RELATIVE POWER (db)


14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=+1.0°
R2003
RELATIVE POWER (db)


14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=0.0°
R2004
RELATIVE POWER (db)


14dB HORN
SCAN: 0.0°
X-POL, AZ CUT
EL=-1.0°
R2005
RELATIVE POWER (db)
Phase (deg.)


14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=-2.0°
R2006
PHASE (deg.)
RELATIVE POWER (db)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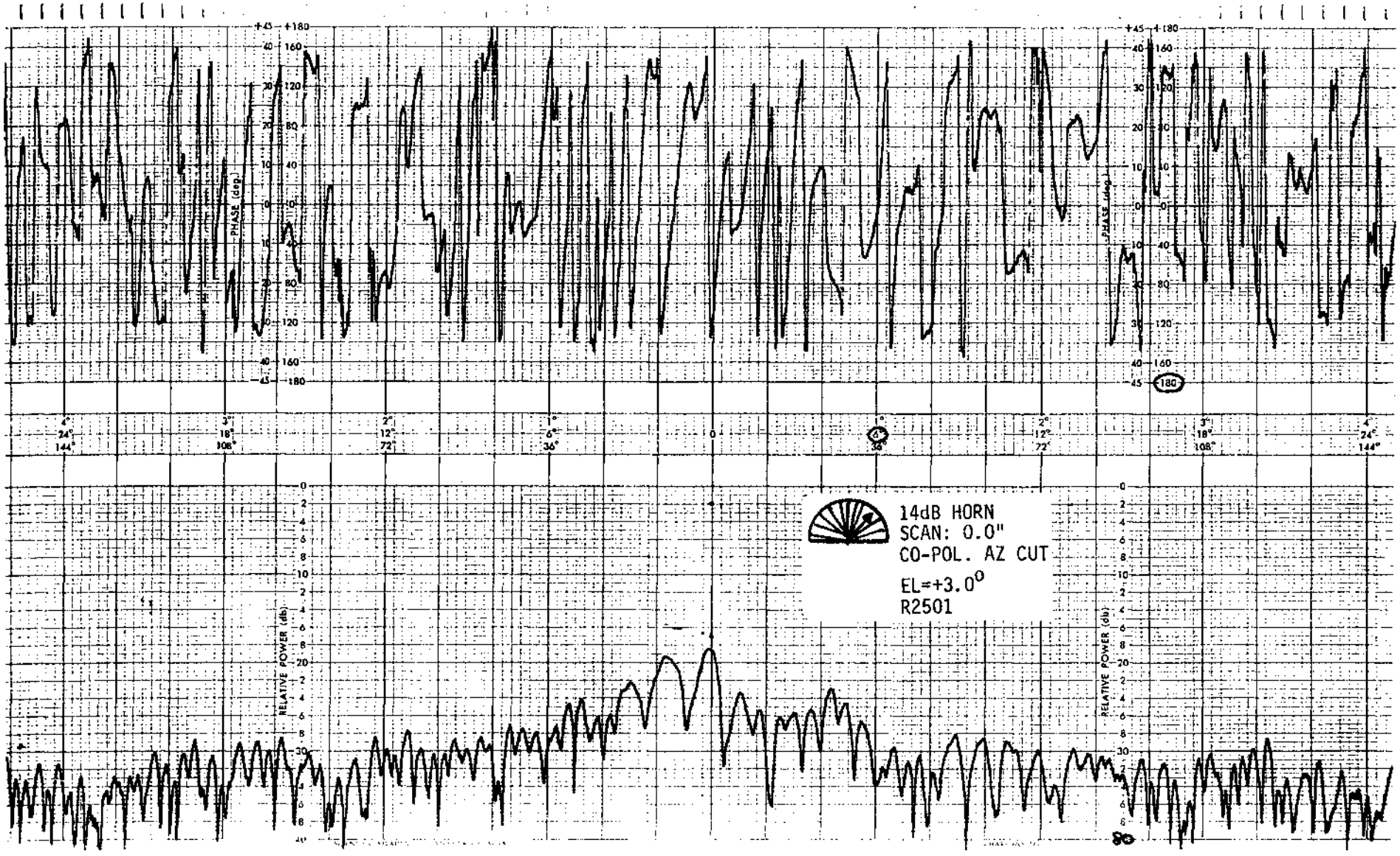
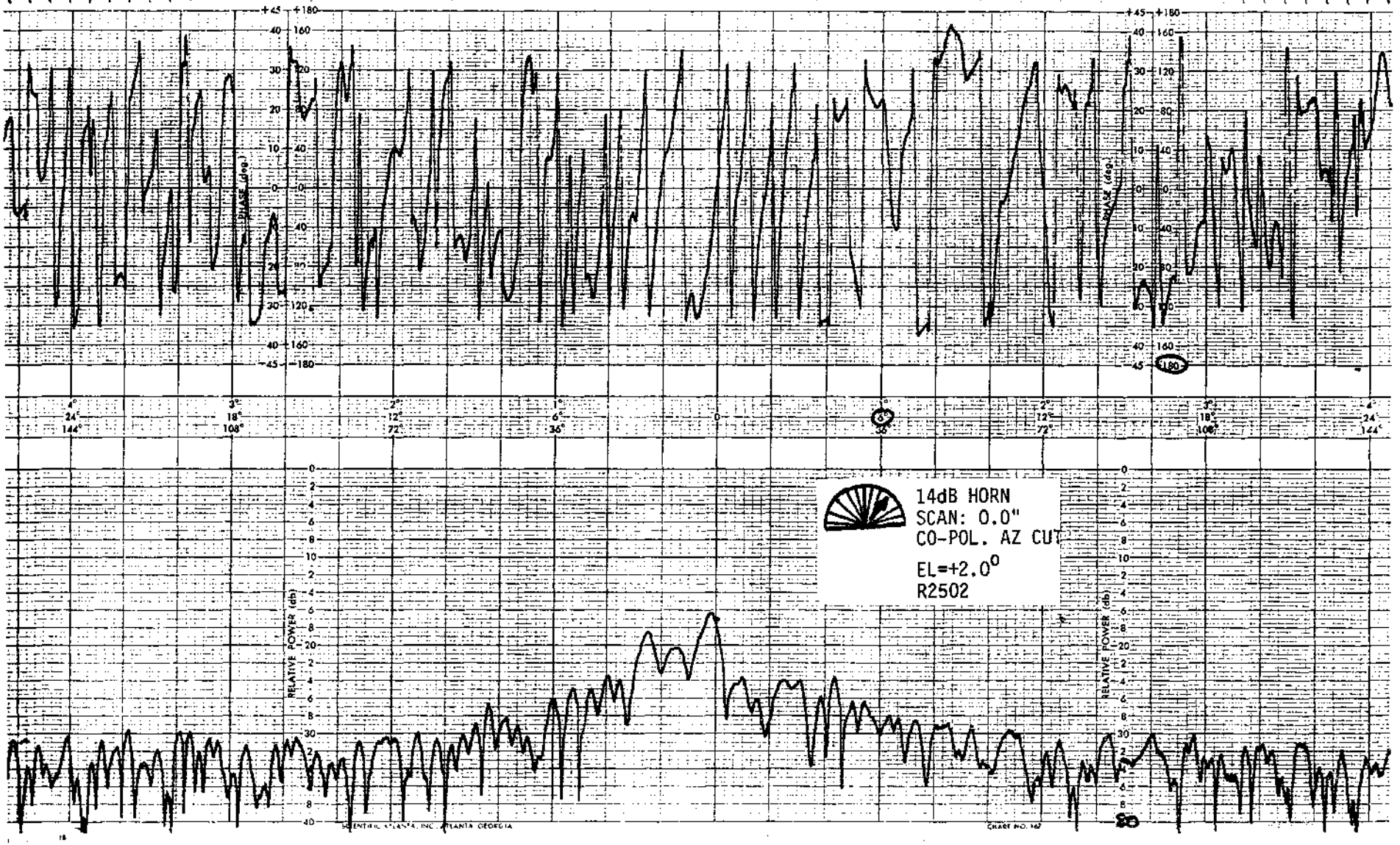
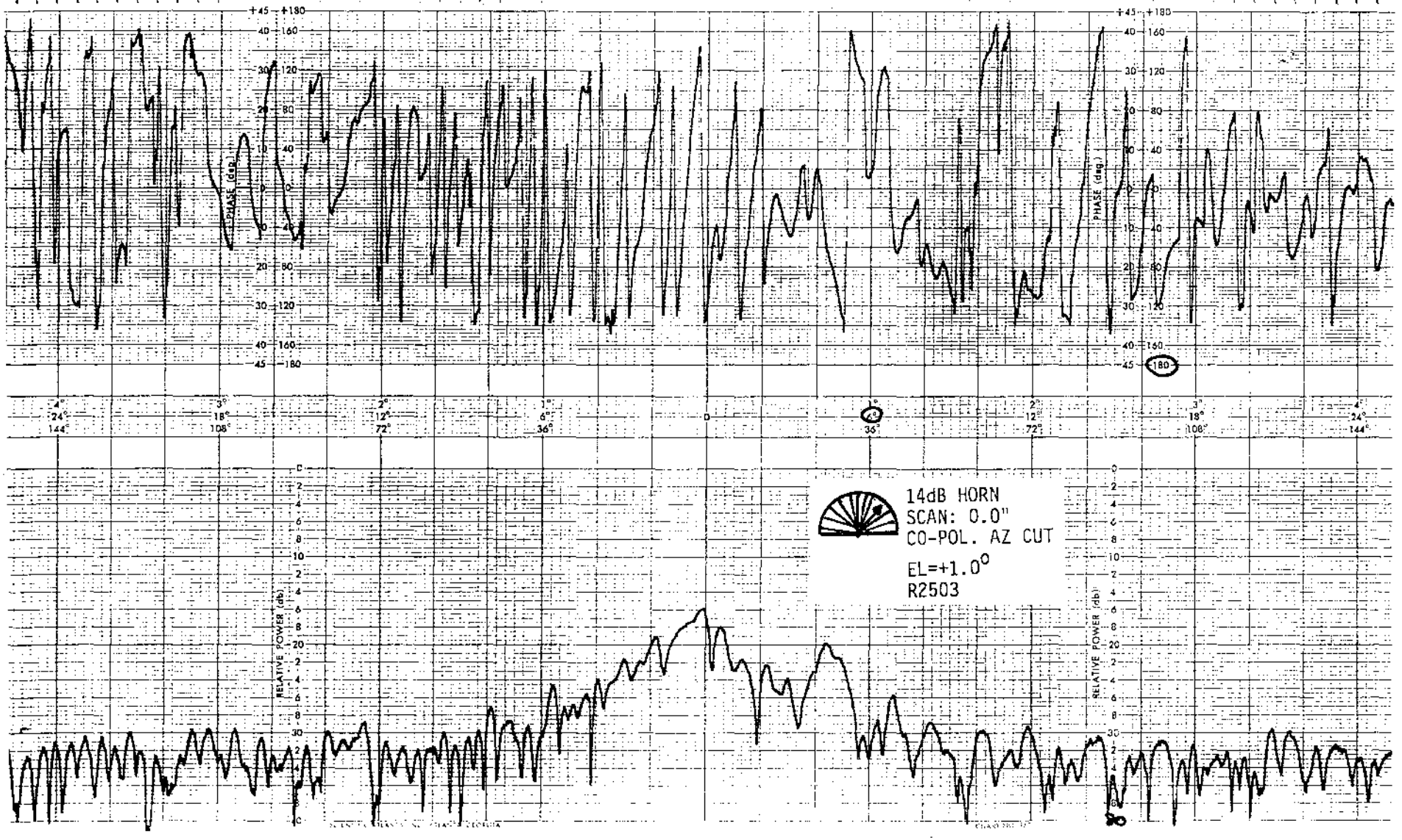
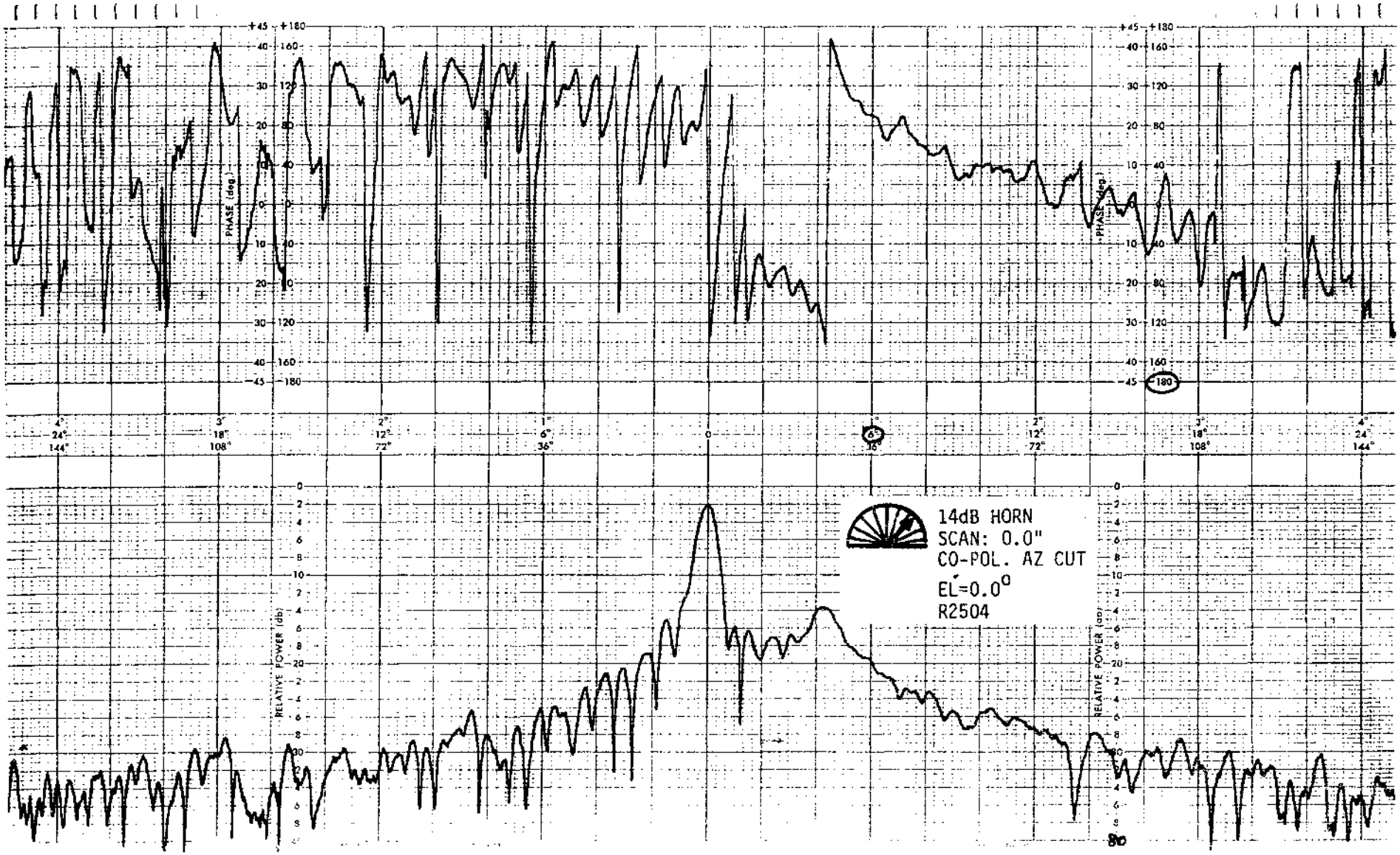
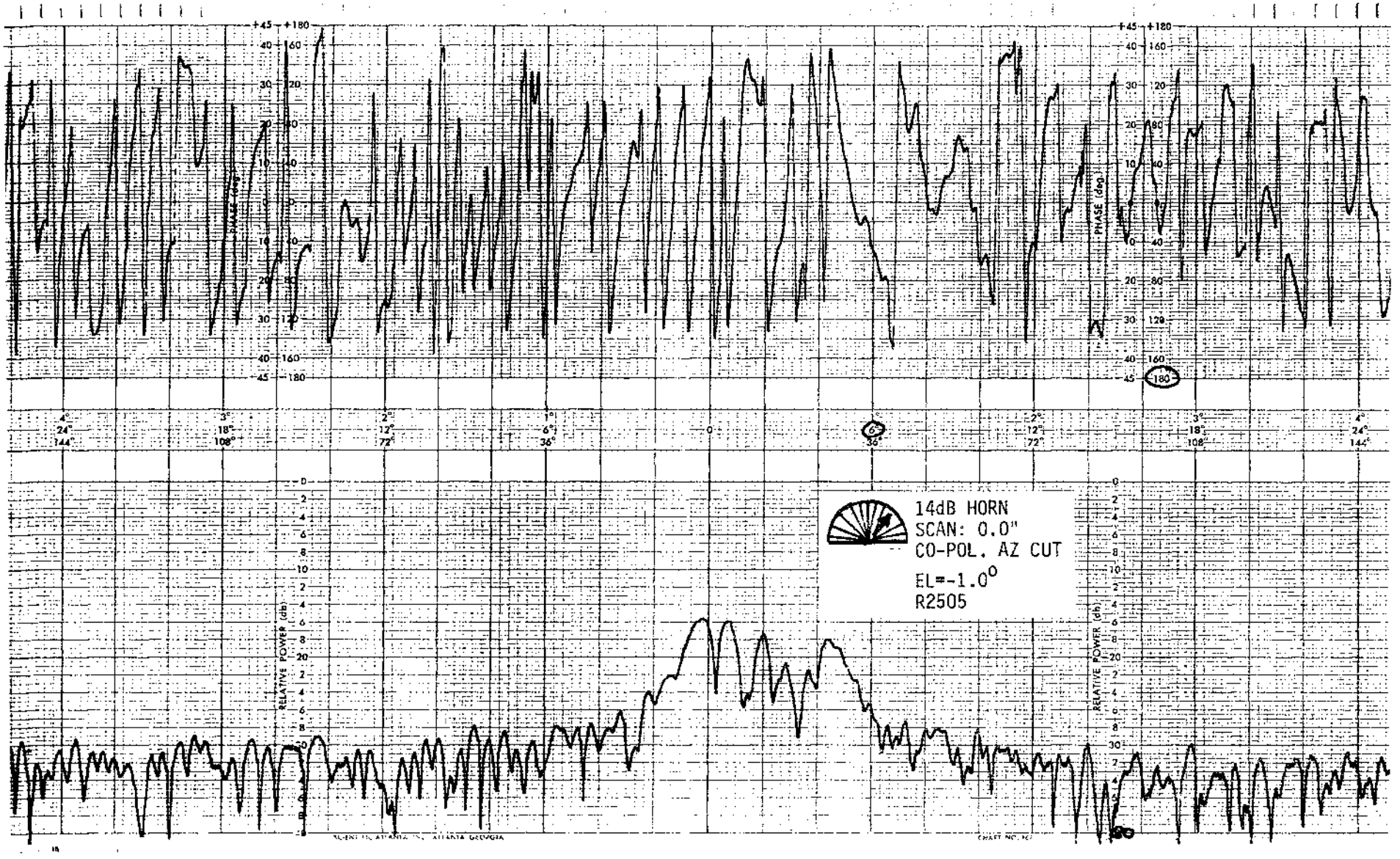
SCAN: 0.0"
X-POL. AZ CUT
EL=-3.0°
R2007
PHASE (deg)
RELATIVE POWER (db)

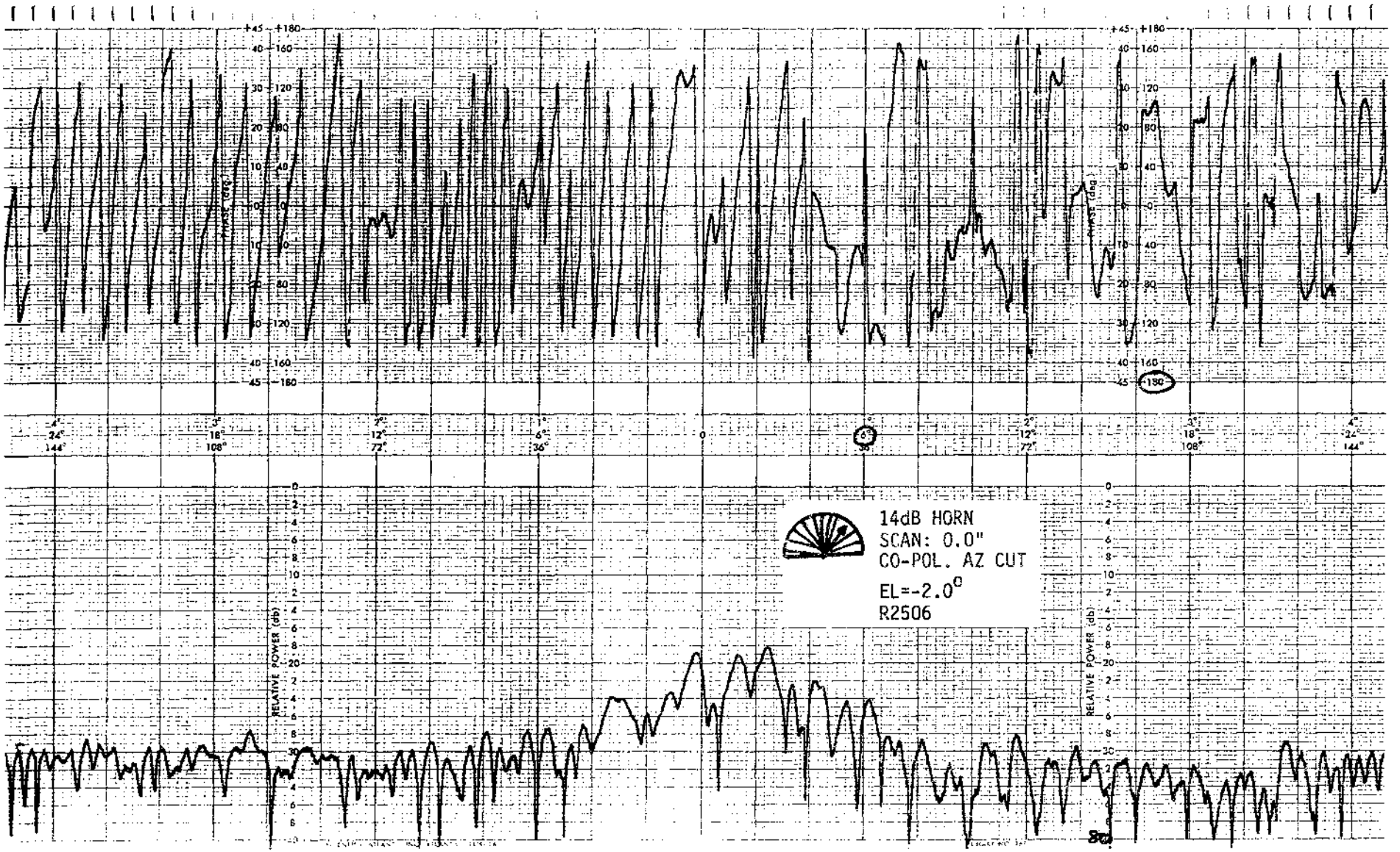

14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=+3.0°
R2501
PHASE (deg.)
RELATIVE POWER (db)

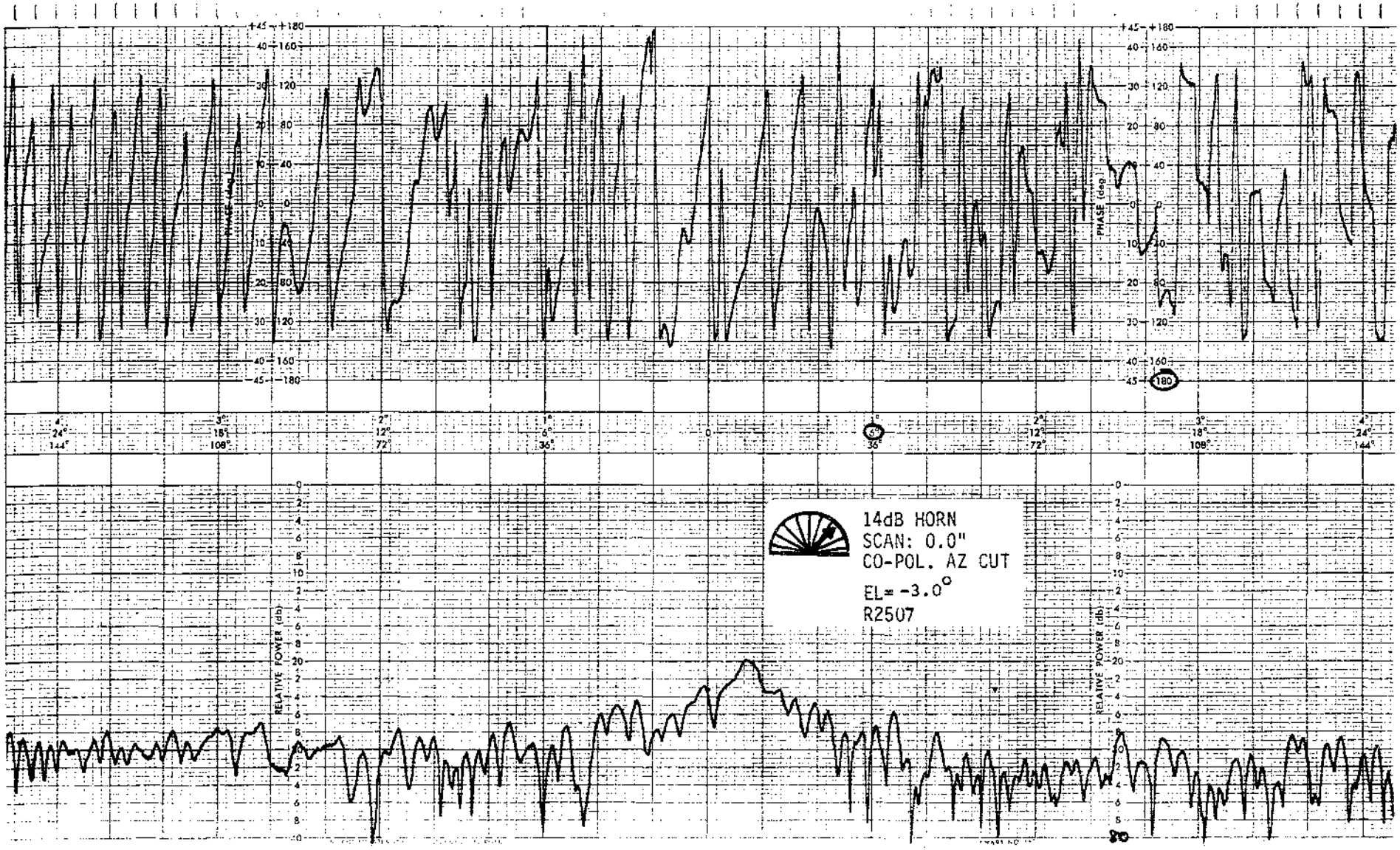

14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=+2.0°
R2502
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC-ATLANTA, INC., ATLANTA GEORGIA
CHART NO. 167


14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=+1.0°
R2503
PHASE (deg)
RELATIVE POWER (db)


14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=0.0°
R2504
PHASE (deg.)
RELATIVE POWER (db)


14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=-1.0°
R2505
PHASE (deg)
RELATIVE POWER (db)


14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=-2.0°
R2506
PHASE (DEG.)
PHASE (deg)
RELATIVE POWER (db)
-180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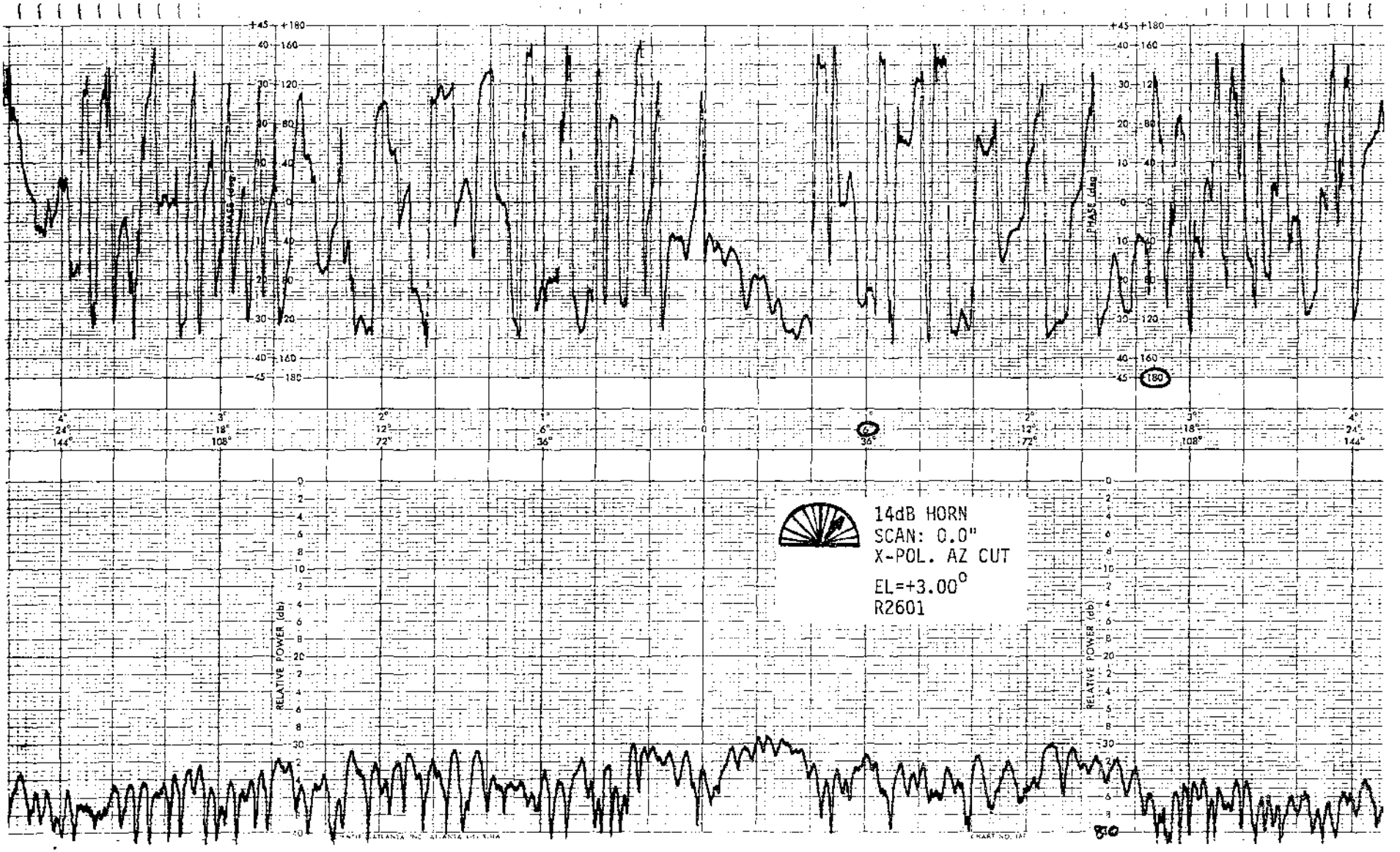
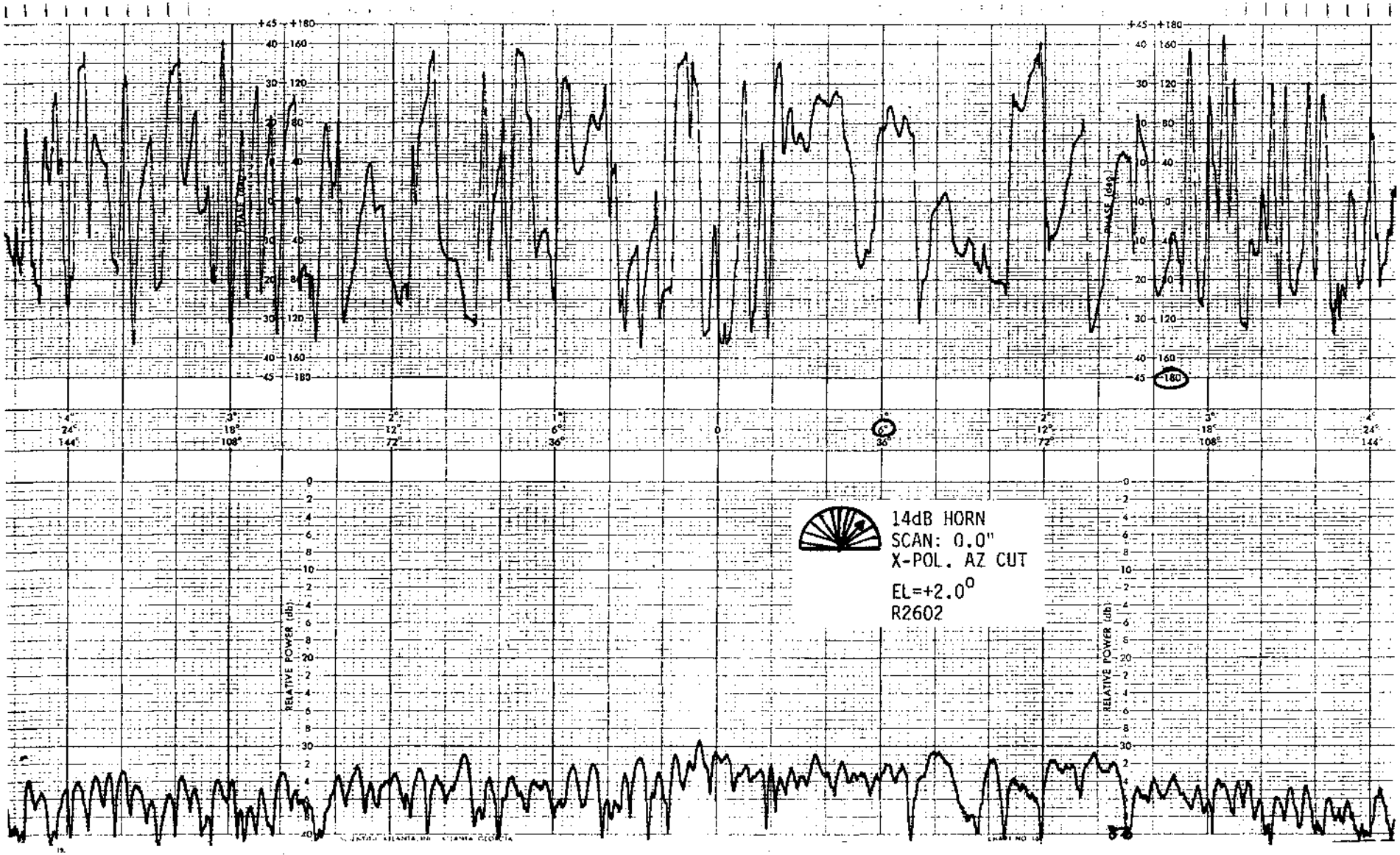
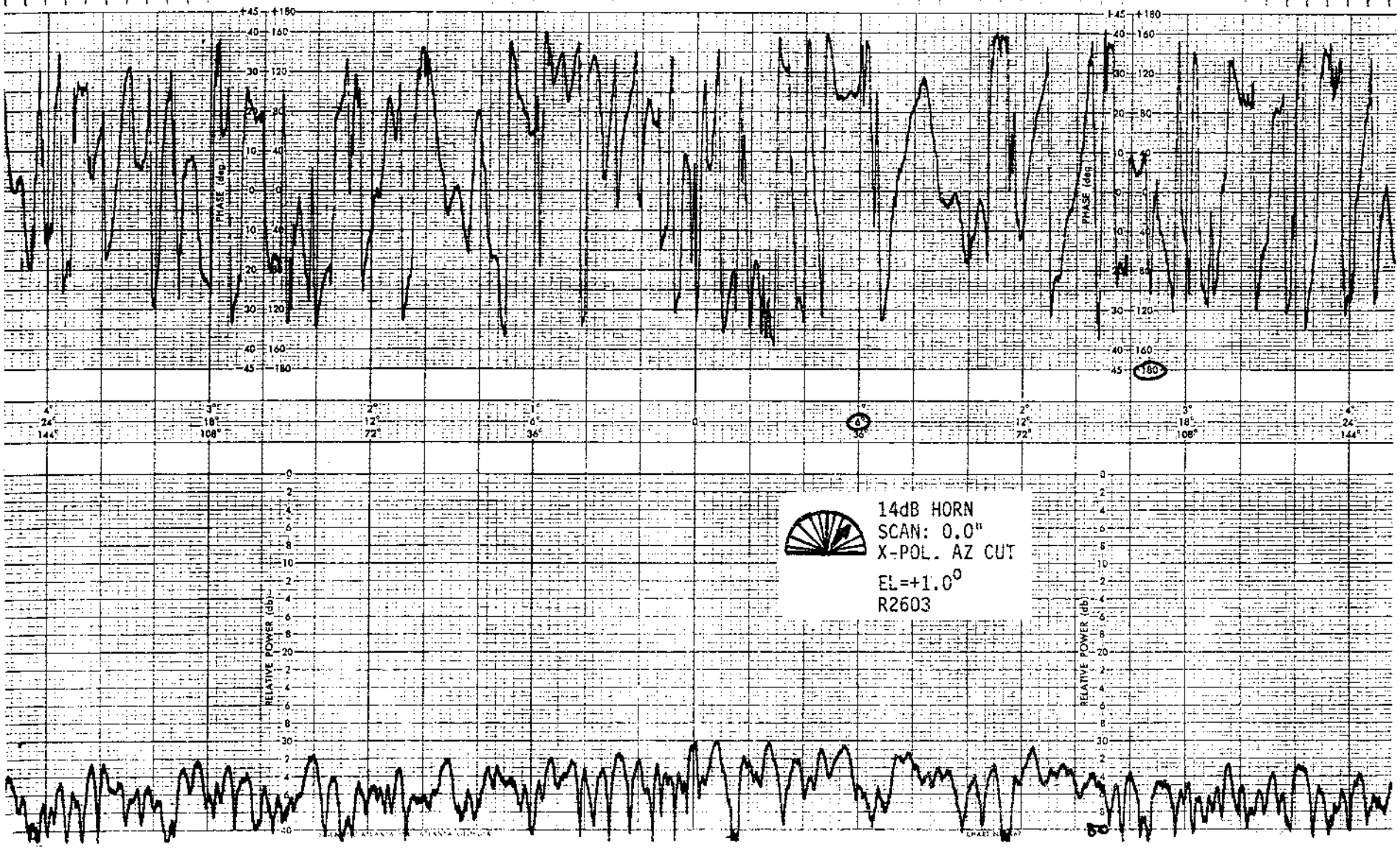
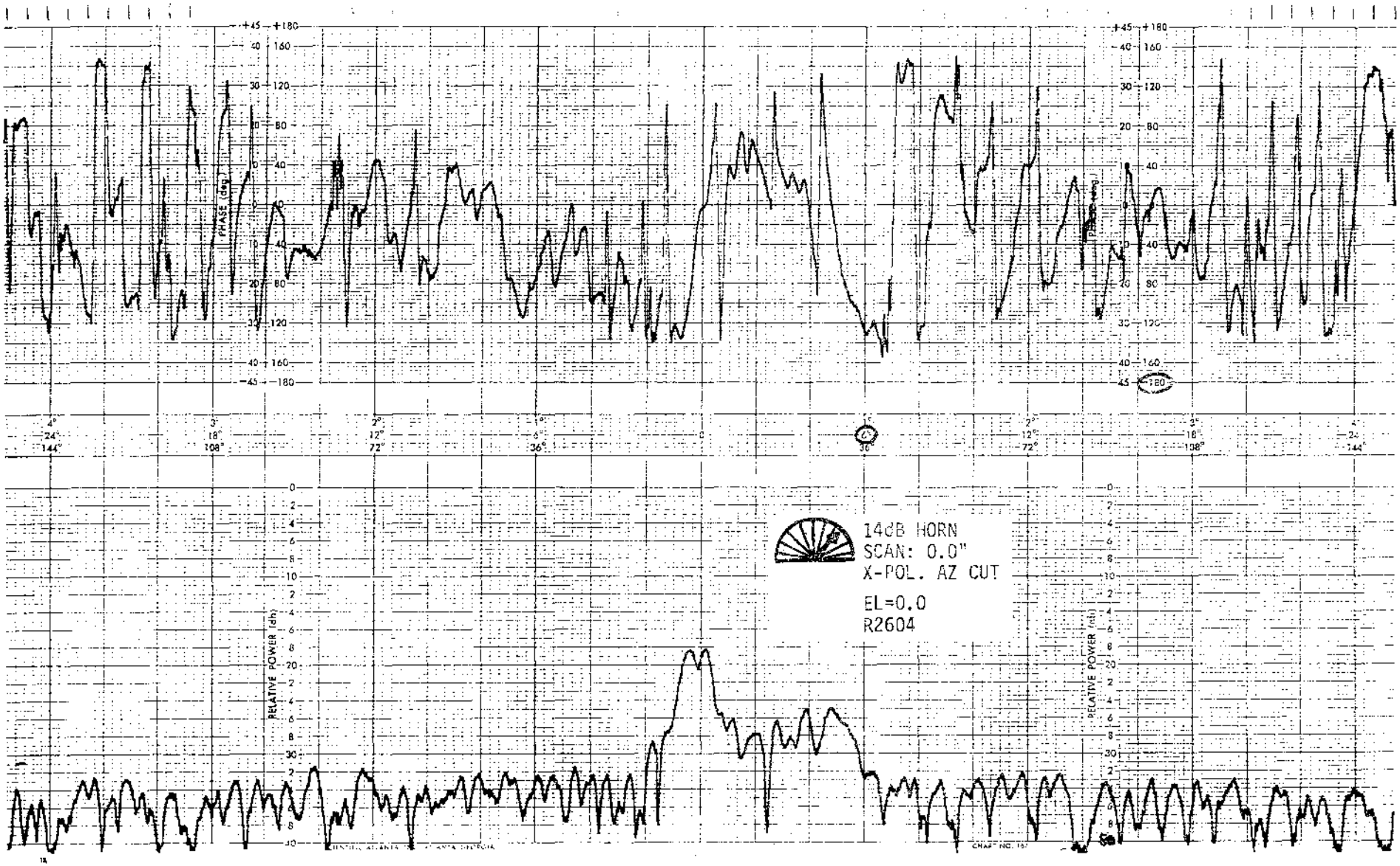
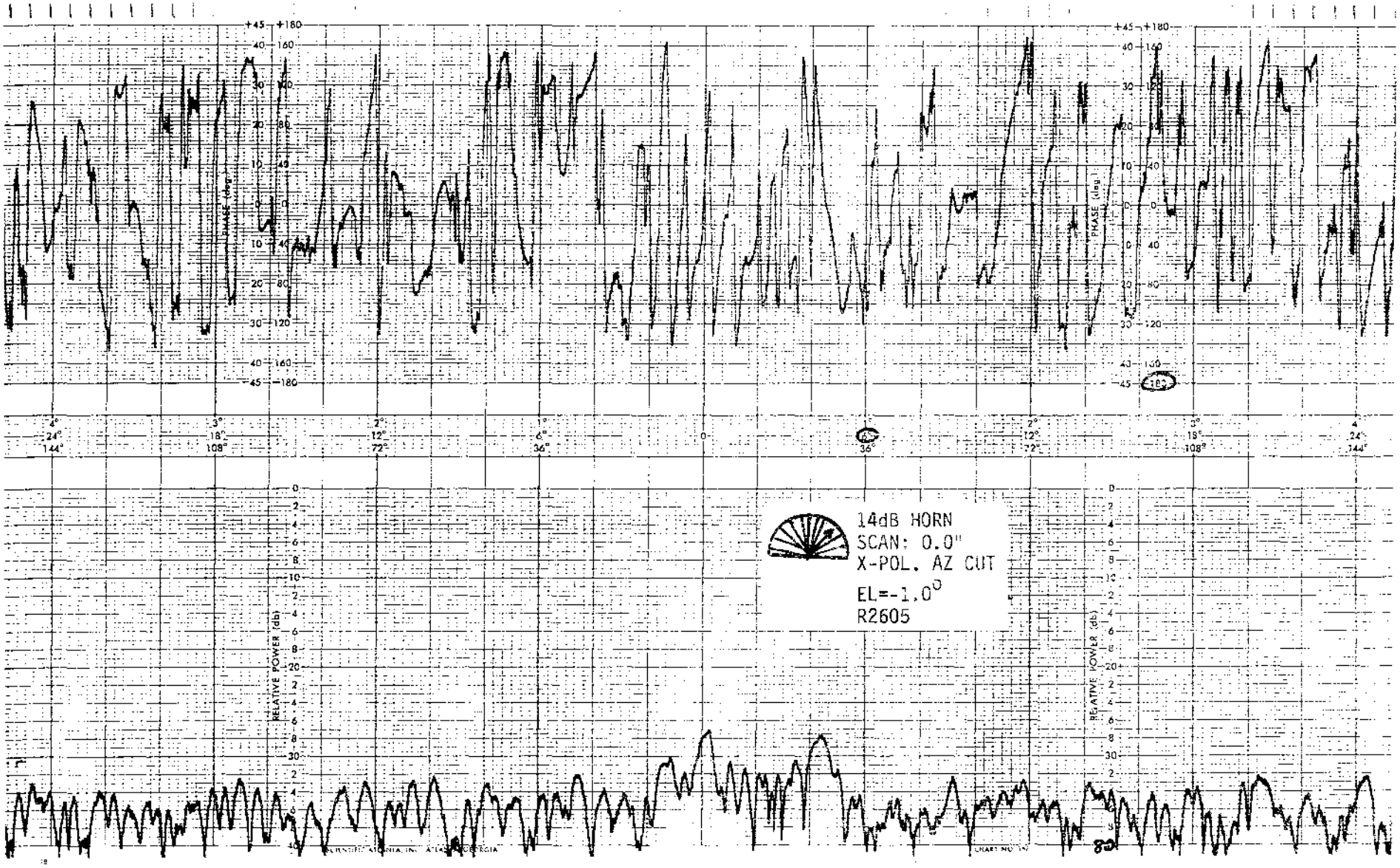
CO-POL. AZ CUT
EL= -3.0°
R2507
PHASE (deg.)
RELATIVE POWER (db)

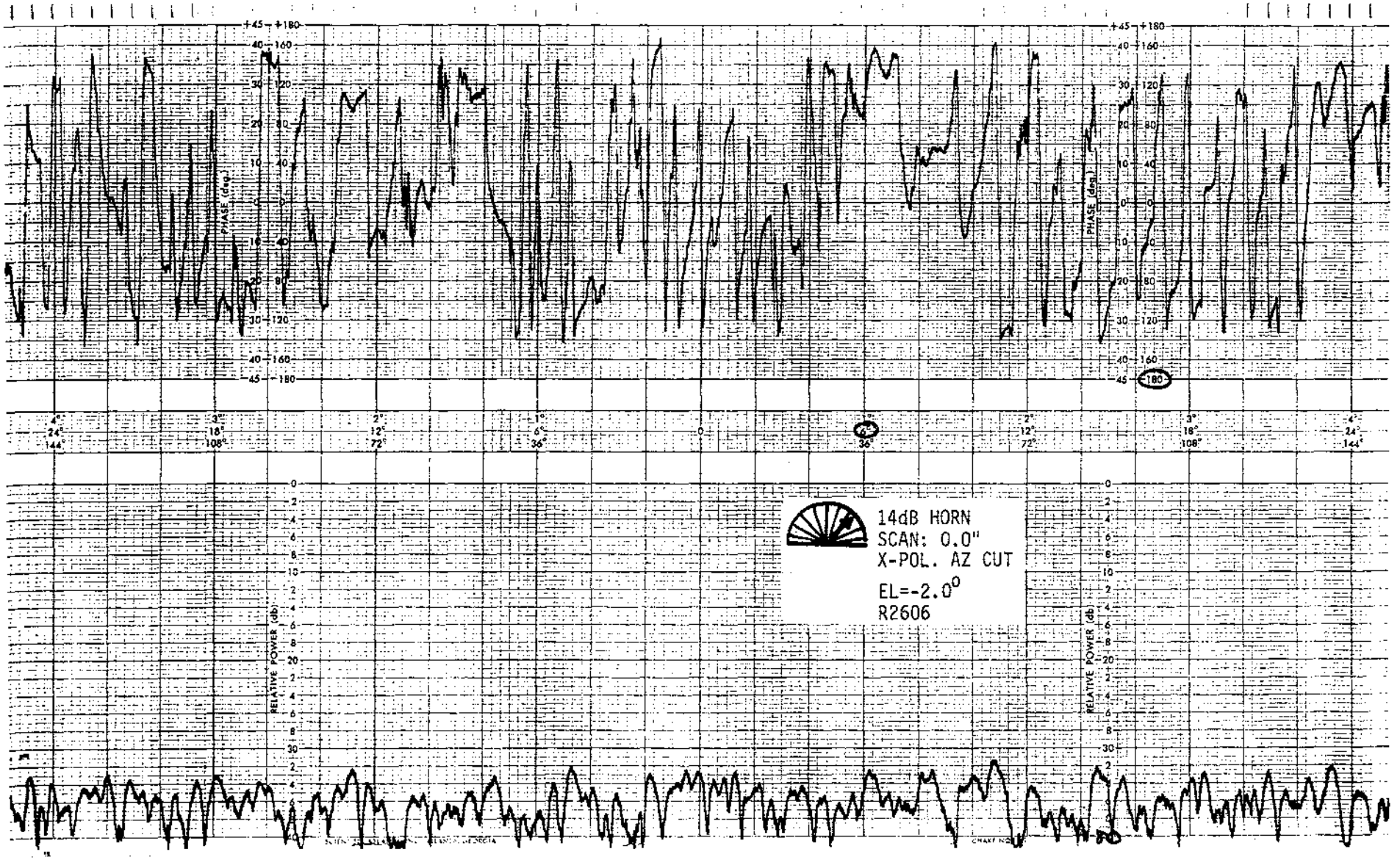

14dB HORN
SCAN: 0.0°
X-POL. AZ CUT
EL=+3.00°
R2601
RELATIVE POWER (db)
PHASE (deg)

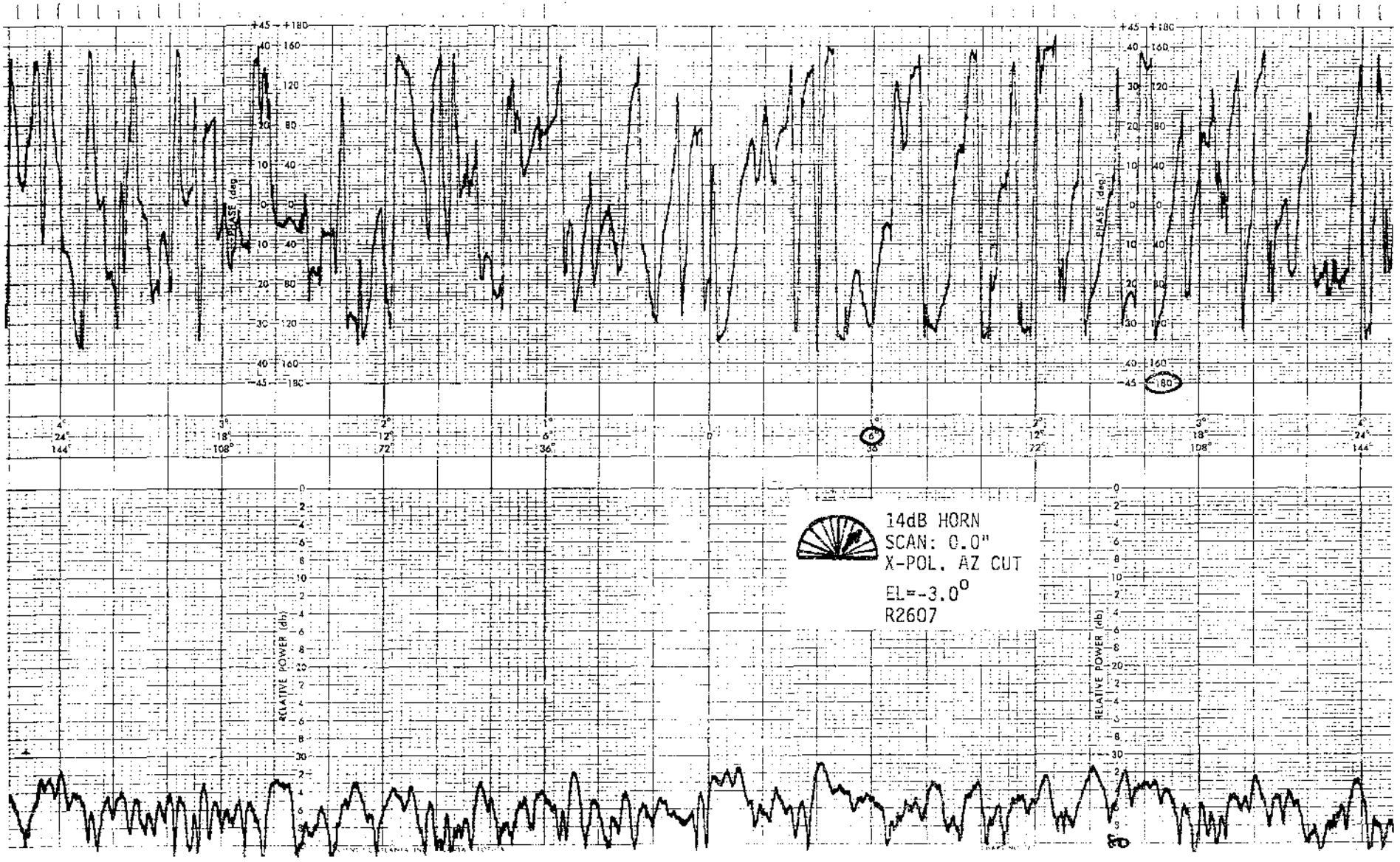

14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=+2.0°
R2602
RELATIVE POWER (db)


PHASE (deg.)
RELATIVE POWER (db)
14dB HORN
SCAN: 0.0°
X-POL. AZ CUT
EL=+1.0°
R2603


14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=0.0
R2604
PHASE (deg)
RELATIVE POWER (db)


14dB HORN
SCAN: 0.0°
X-POL. AZ CUT
EL=-1.0°
R2605
RELATIVE POWER (db)
PHASE (deg)

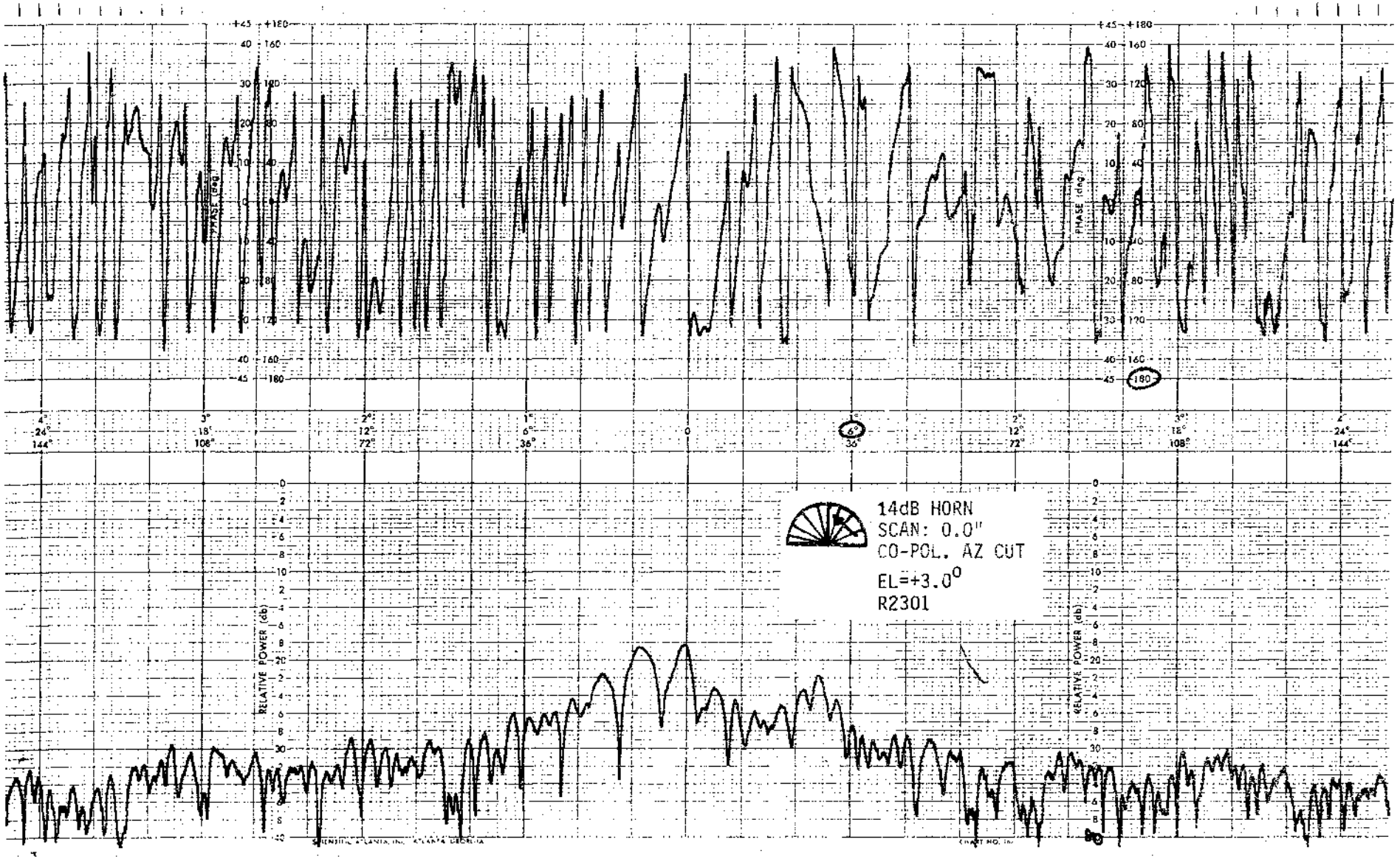

14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=-2.0°
R2606
PHASE (deg)
RELATIVE POWER (db)

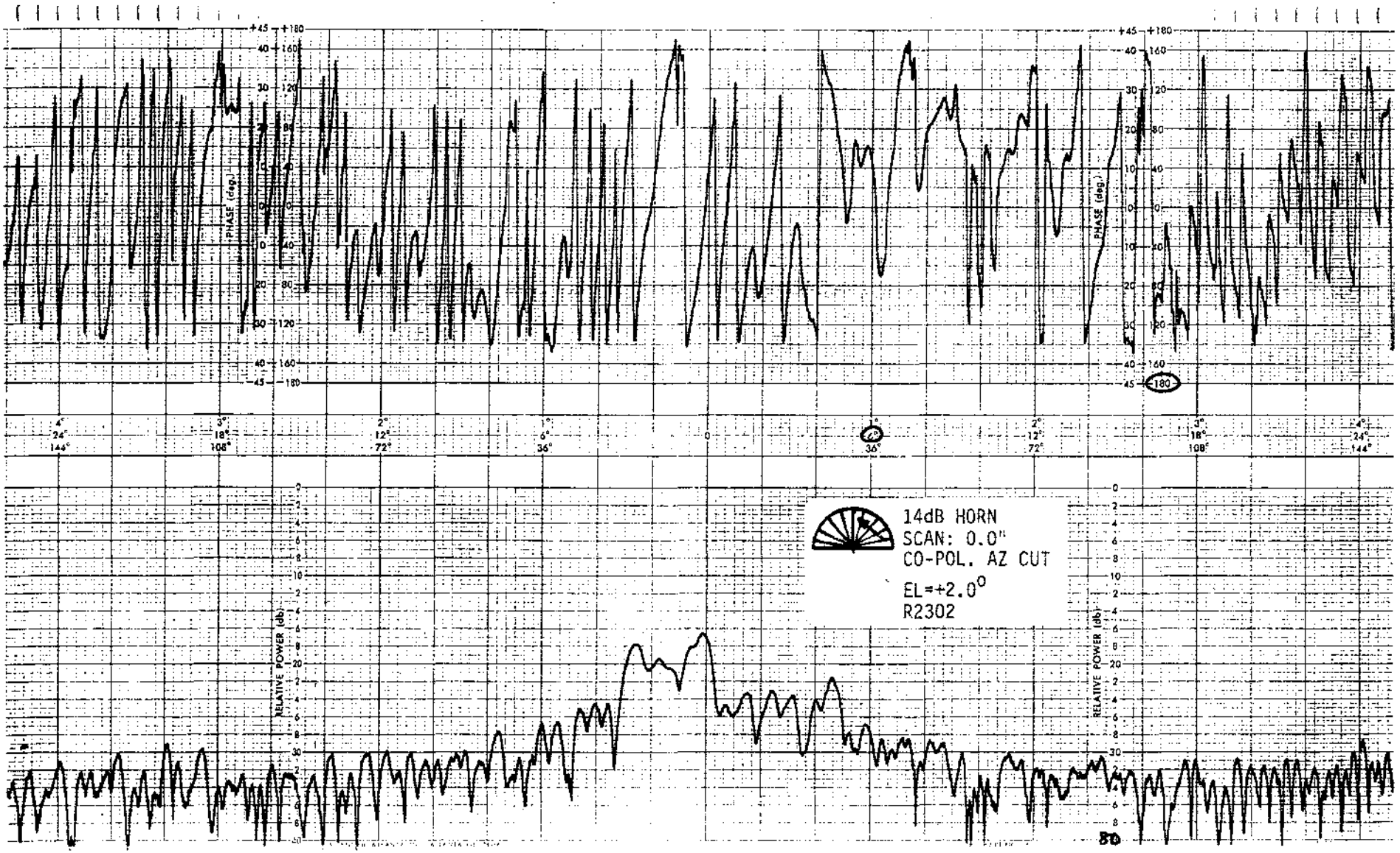

14dB HORN
SCAN: 0.0°
X-POL. AZ CUT
EL=-3.0°
R2607
PHASE (deg.)
RELATIVE POWER (db)

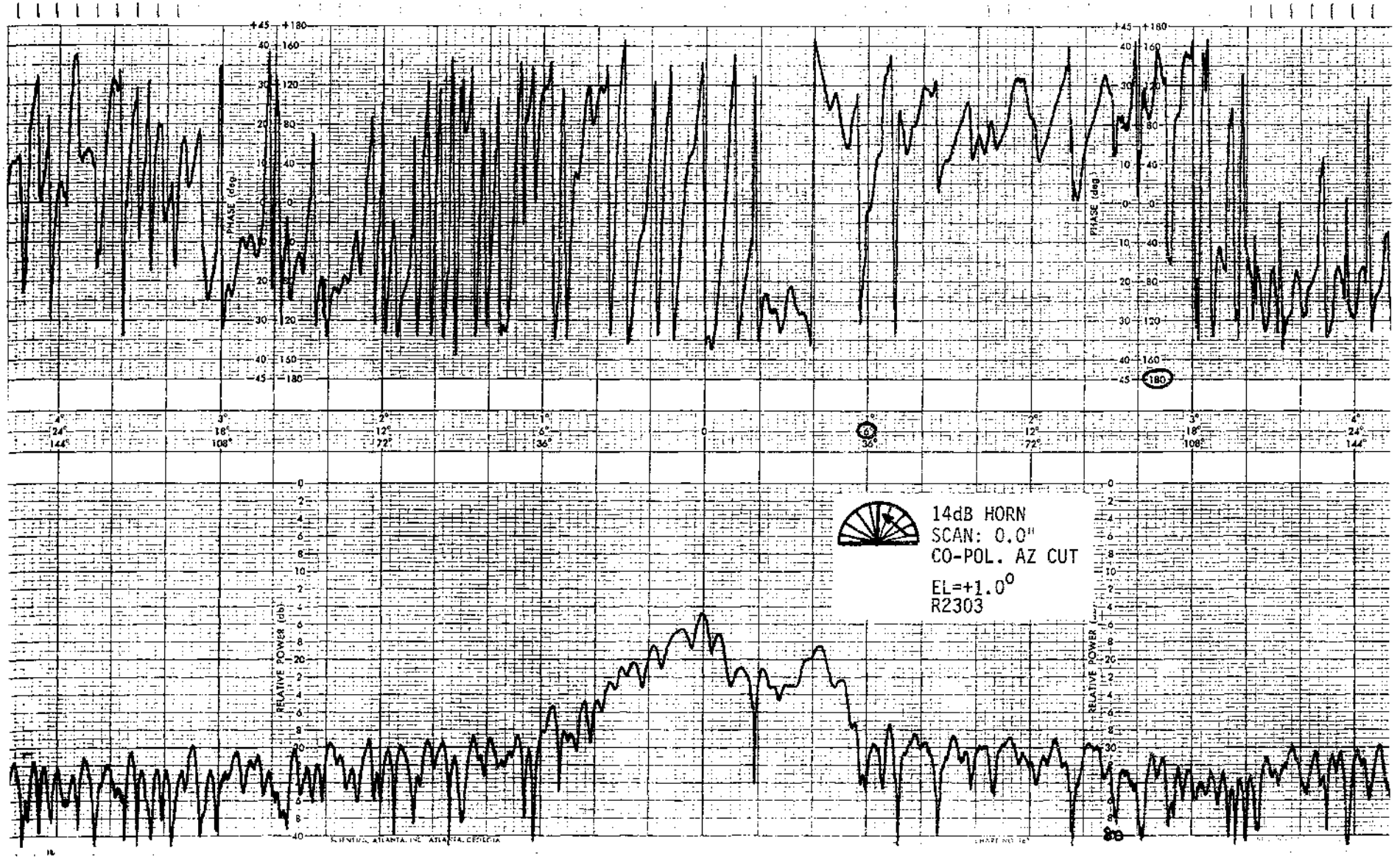
LSST - X

SECONDARY PATTERN LOG

CONFIGURATION	HORN	SCAN	POL.	PK. GAIN	PATTERN	FILE NAME	PAGE NUMBER
	14 dB	0.0"	CO	-	$+3^{\circ}$EL $\pm$ 45°AZ	R2301	308
	"	"	"	-	$+2^{\circ}$EL "	R2302	309
	"	"	"	-	$+1^{\circ}$EL "	R2303	310
	"	"	"	50.50	0°EL "	R2304	311
	"	"	"	-	-1°EL "	R2305	312
	"	"	"	-	-2°EL "	R2306	313
	"	"	"	-	-3°EL "	R2307	314
	14 dB	0.0"	X	-	$+3^{\circ}$EL "	R2401	315
	"	"	"	-	$+2^{\circ}$EL "	R2402	316
	"	"	"	-	$+1^{\circ}$EL "	R2403	317
	"	"	"	-	0°EL "	R2404	318
	"	"	"	-	-1°EL "	R2405	319
	"	"	"	-	-2°EL "	R2406	320
	"	"	"	-	-3°EL "	R2407	321


14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=+3.0°
R2301
PHASE (deg)
RELATIVE POWER (db)


14dB HORN
SCAN: 0.0°
CO-POL. AZ CUT
EL=+2.0°
R2302
PHASE (deg.)
RELATIVE POWER (db)


14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=+1.0°
R2303
PHASE (deg.)
RELATIVE POWER (db)

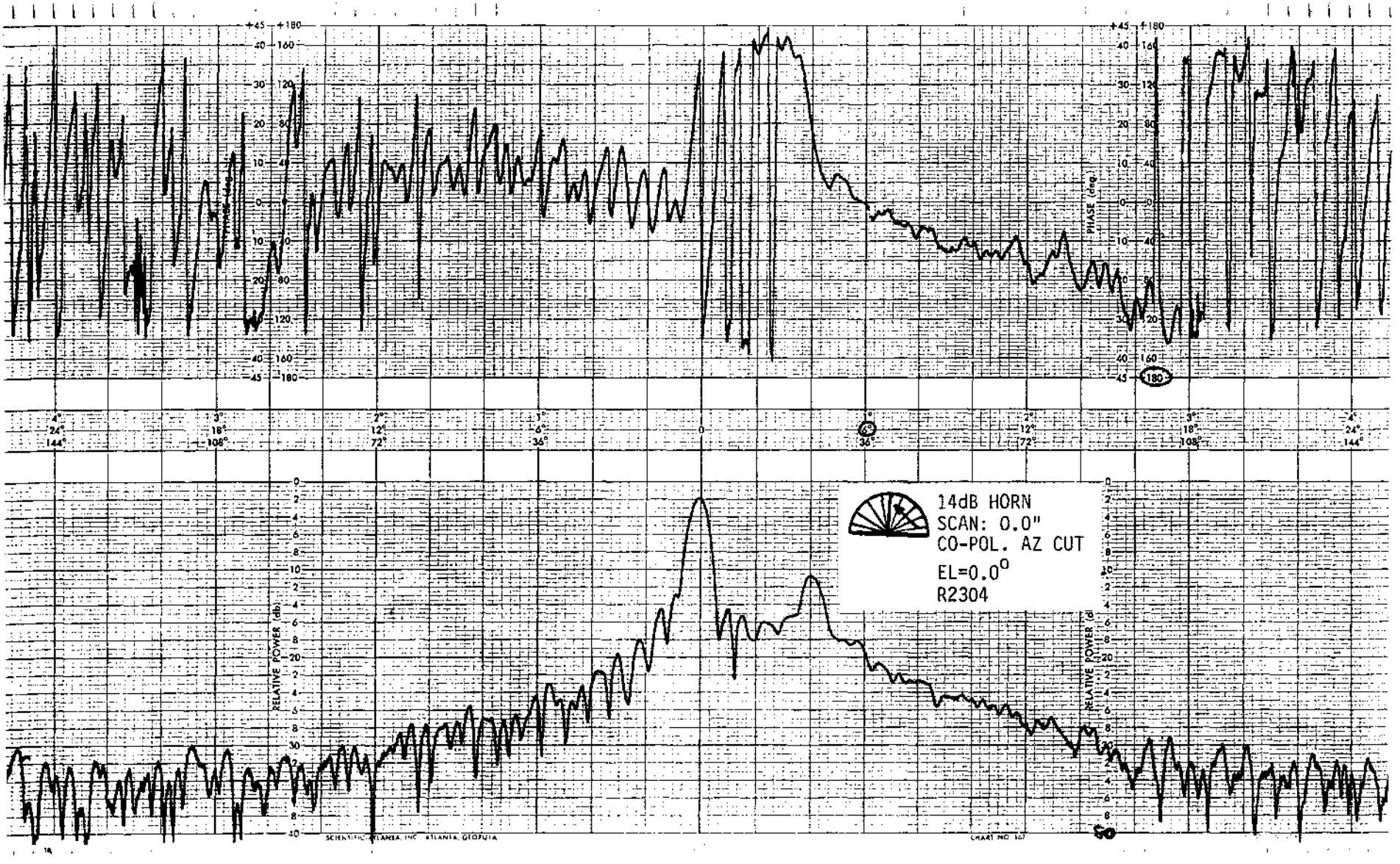

14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=0.0°
R2304
PHASE (deg.)
RELATIVE POWER (db)
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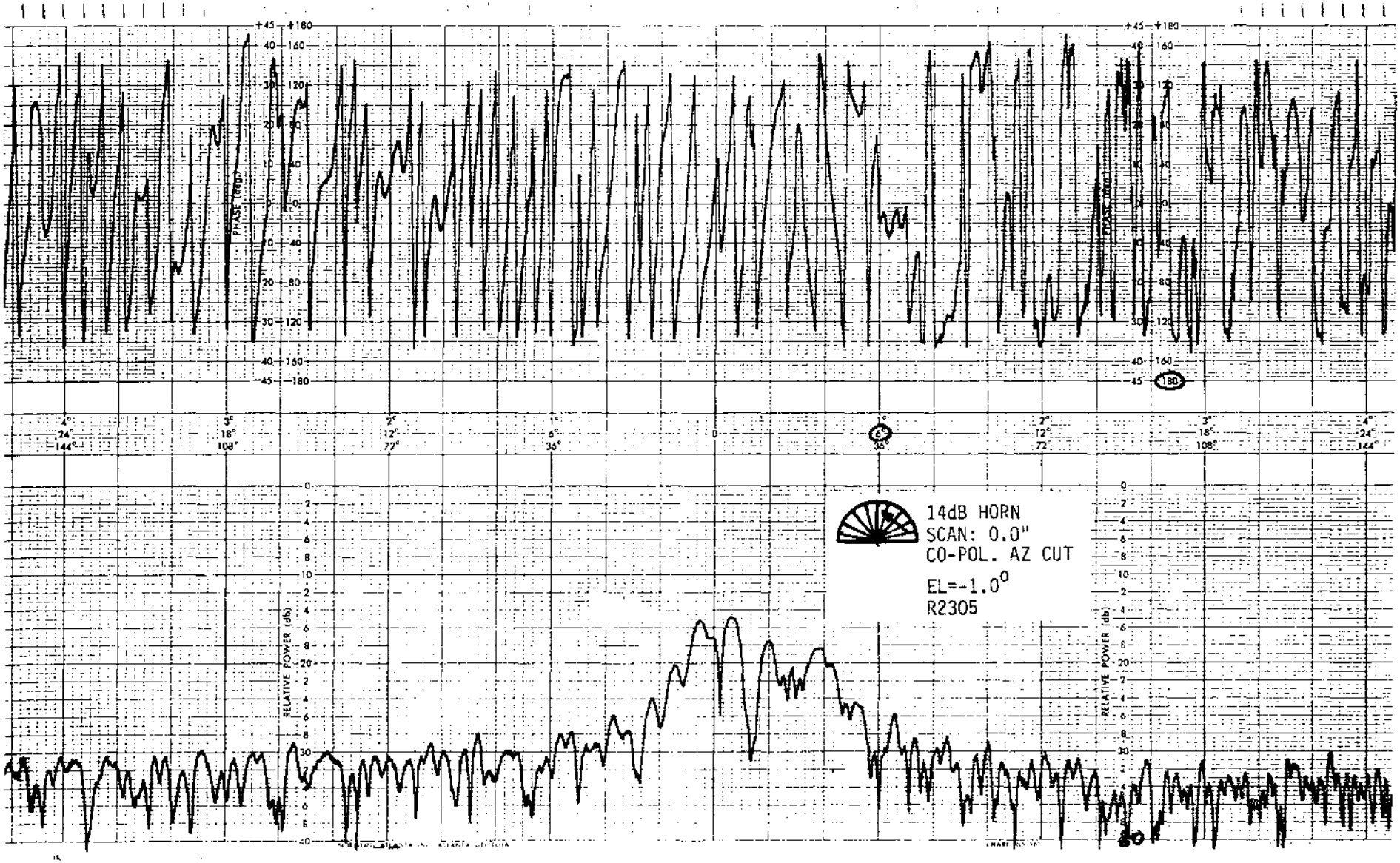
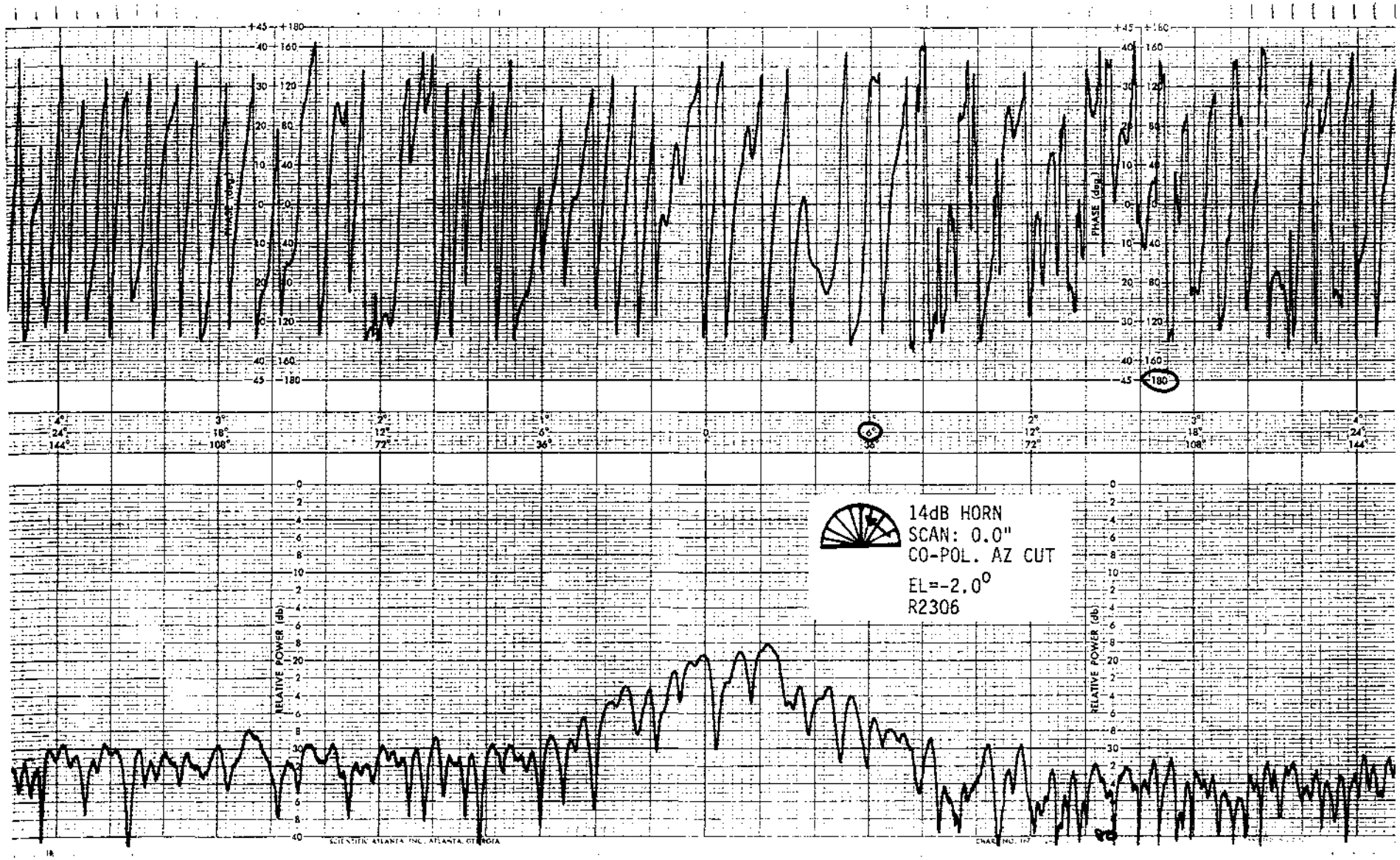
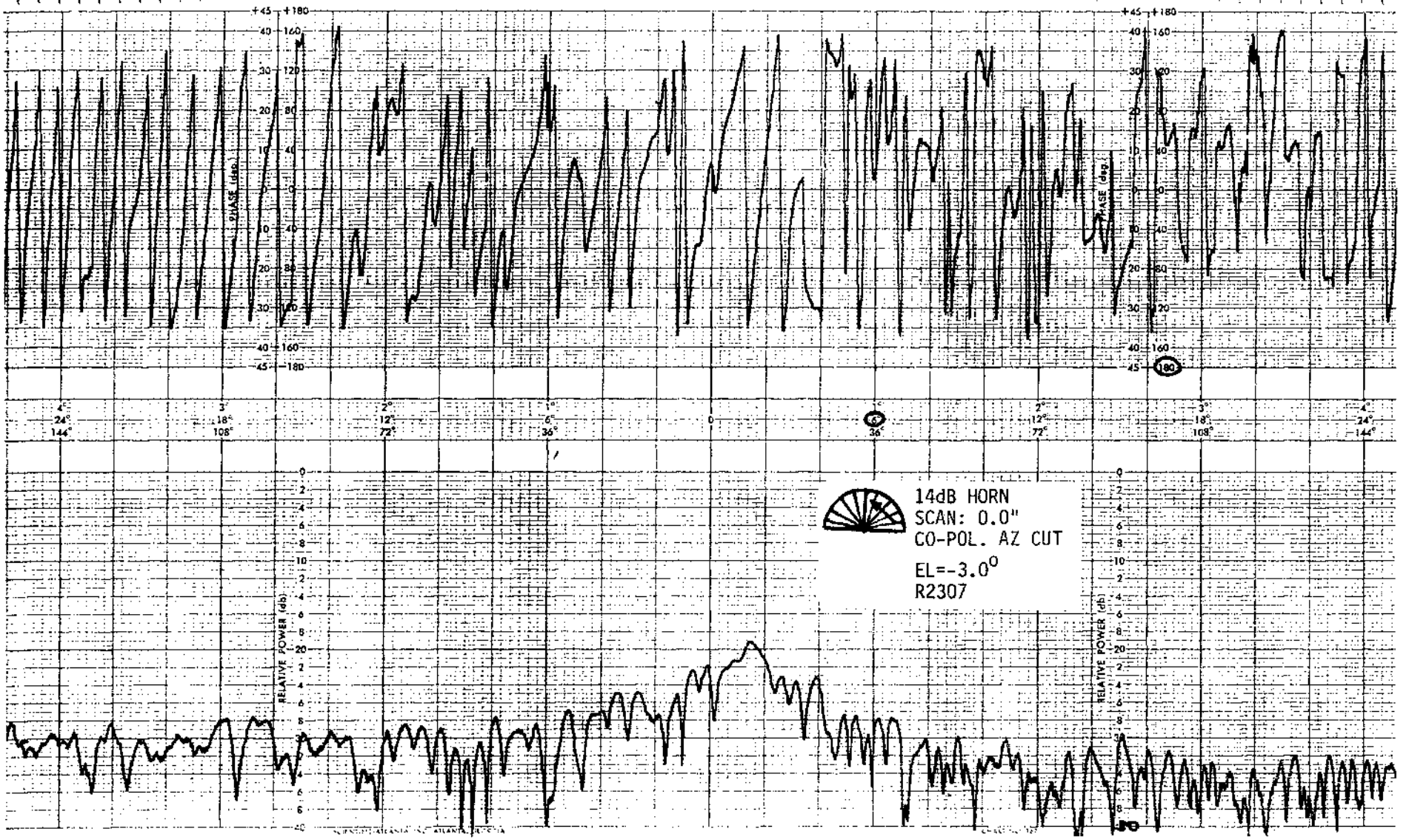
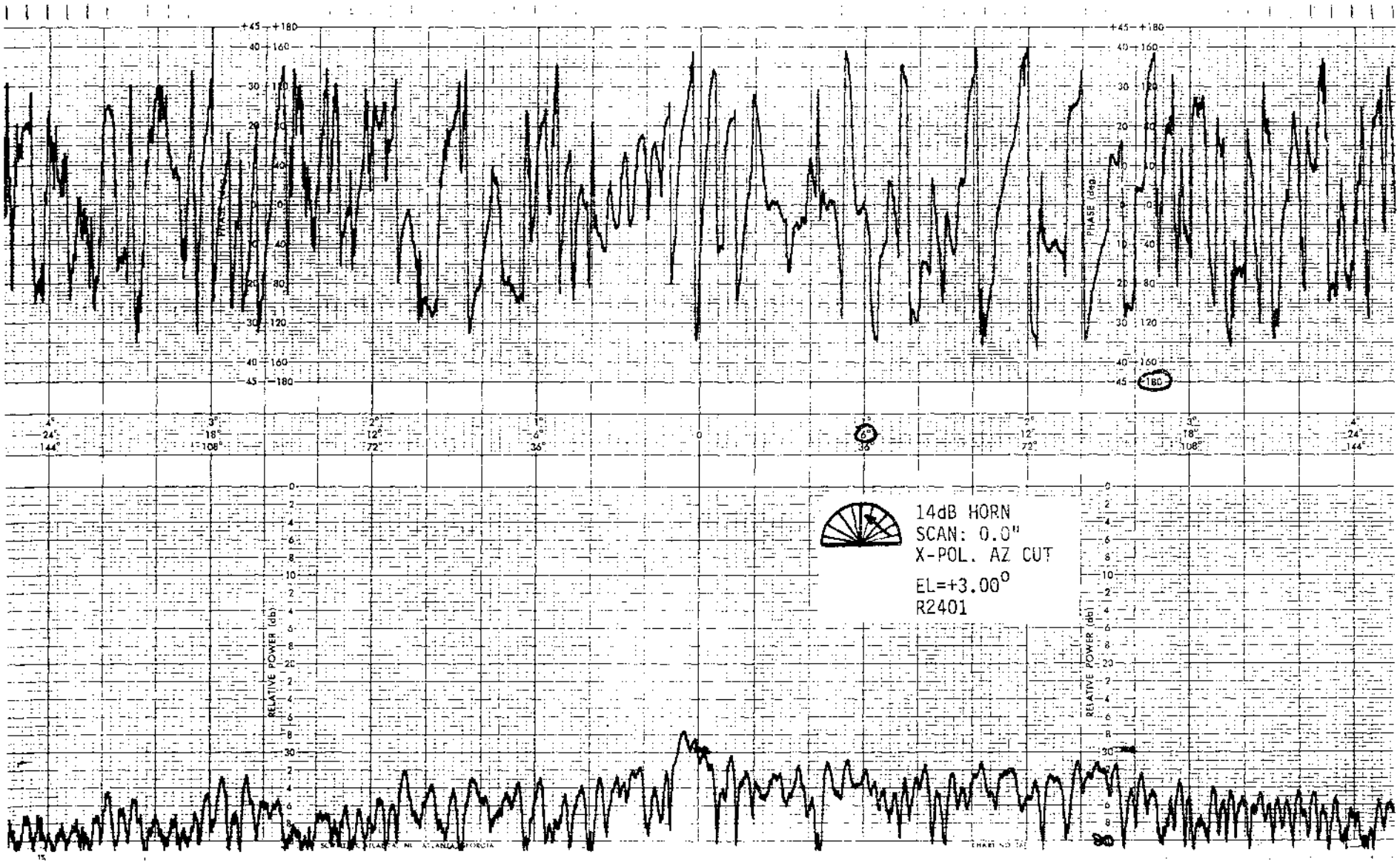
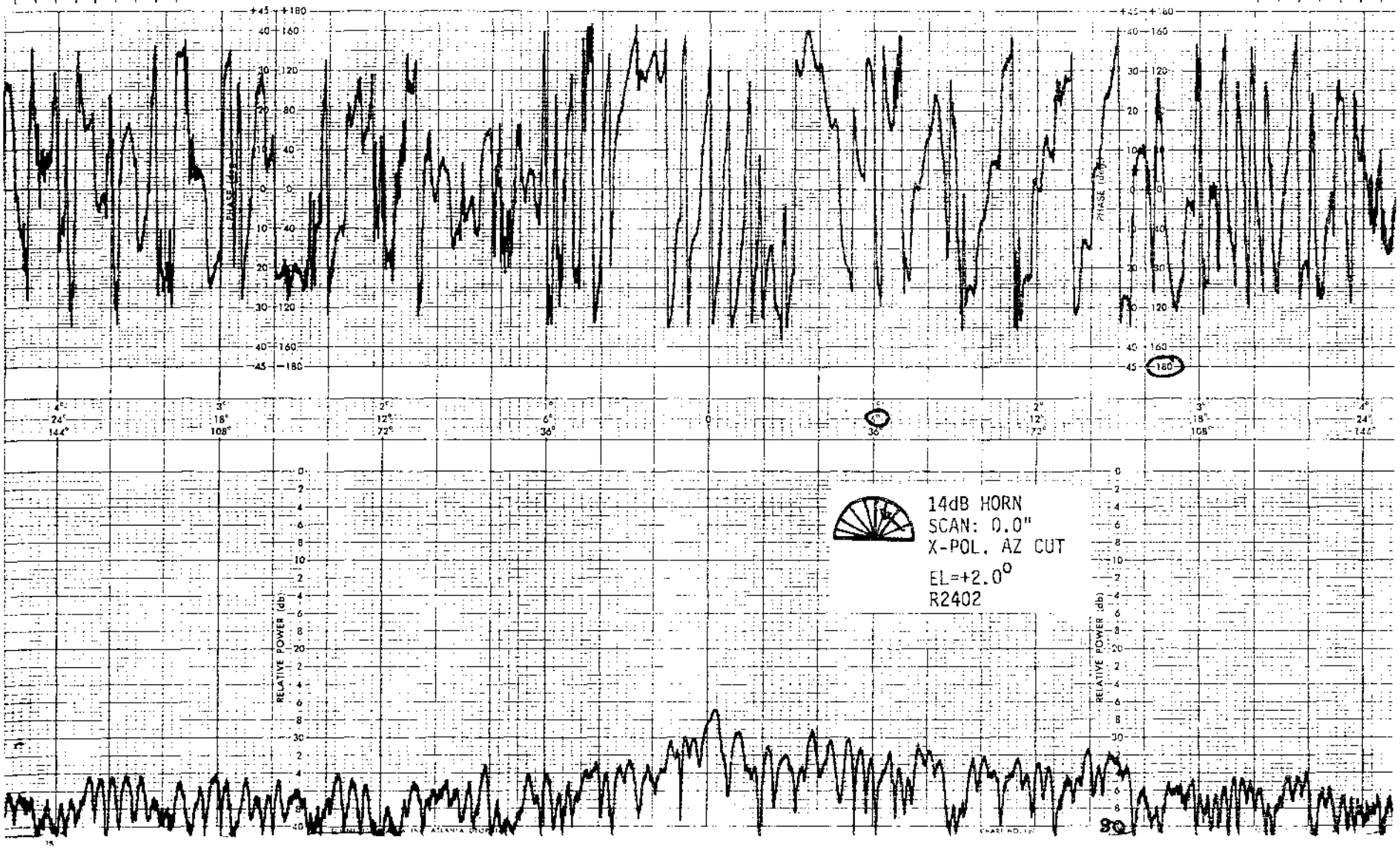
CHART NO. 167

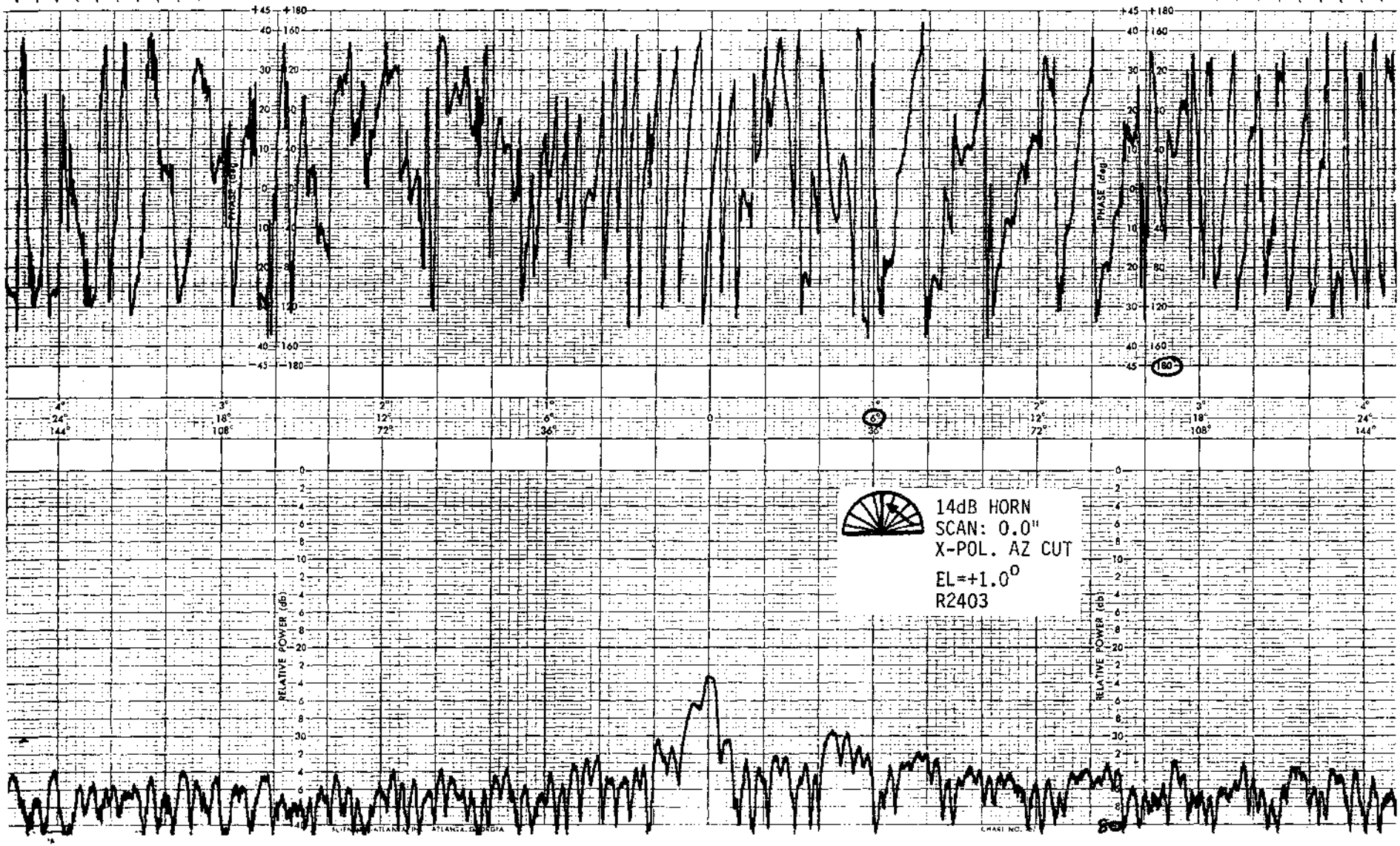

14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=-1.0°
R2305
PHASE (deg)
RELATIVE POWER (db)


14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=-2.0°
R2306
PHASE (deg.)
RELATIVE POWER (db)
SCIENTIFIC ATLANTA, INC., ATLANTA, GEORGIA


14dB HORN
SCAN: 0.0"
CO-POL. AZ CUT
EL=-3.0°
R2307
PHASE (deg.)
RELATIVE POWER (db)


14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=+3.00°
R2401
PHASE (deg.)
RELATIVE POWER (db)


14dB HORN
SCAN: 0.0°
X-POL. AZ CUT
EL=+2.0°
R2402
RELATIVE POWER (db)
PHASE (deg)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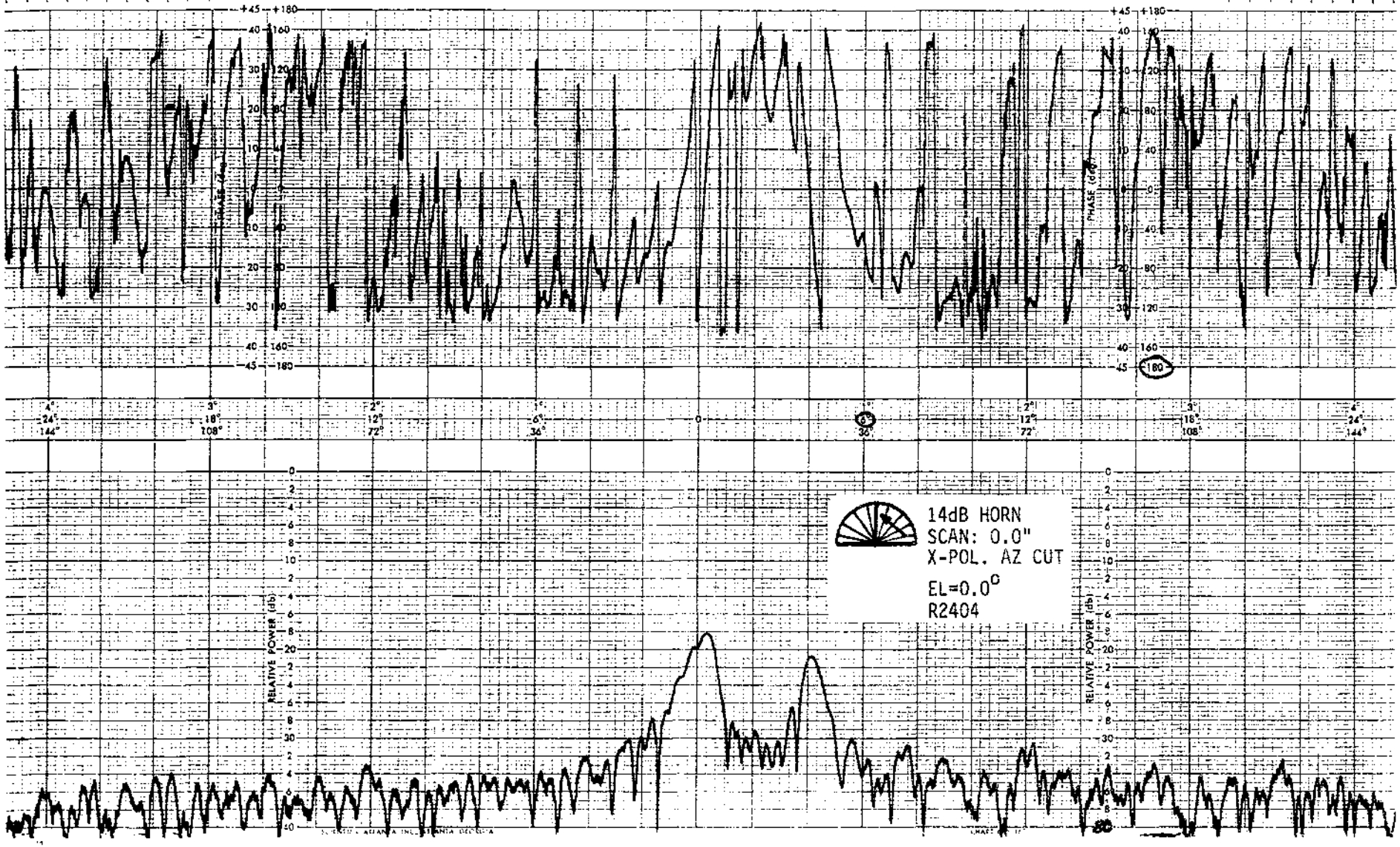
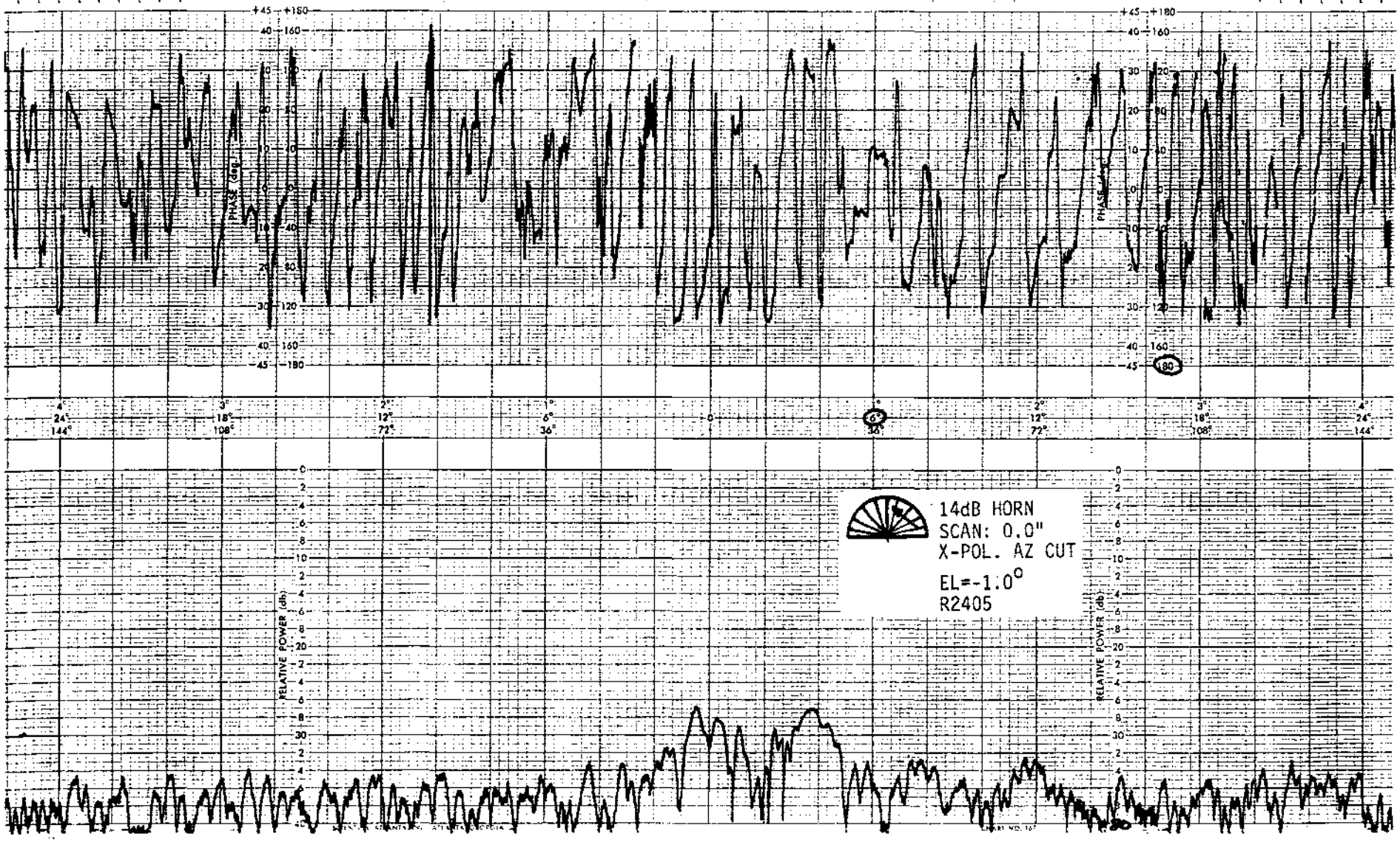
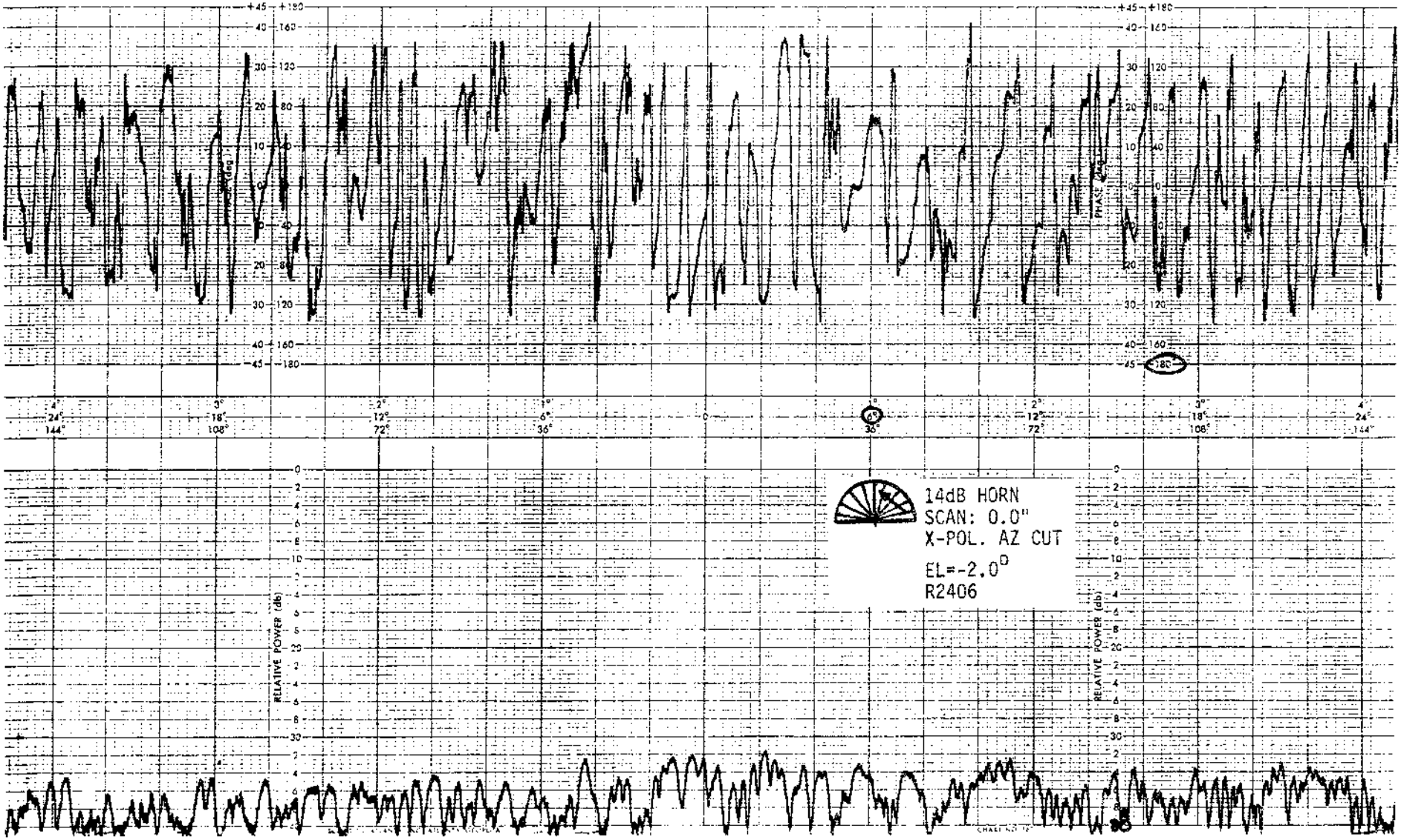
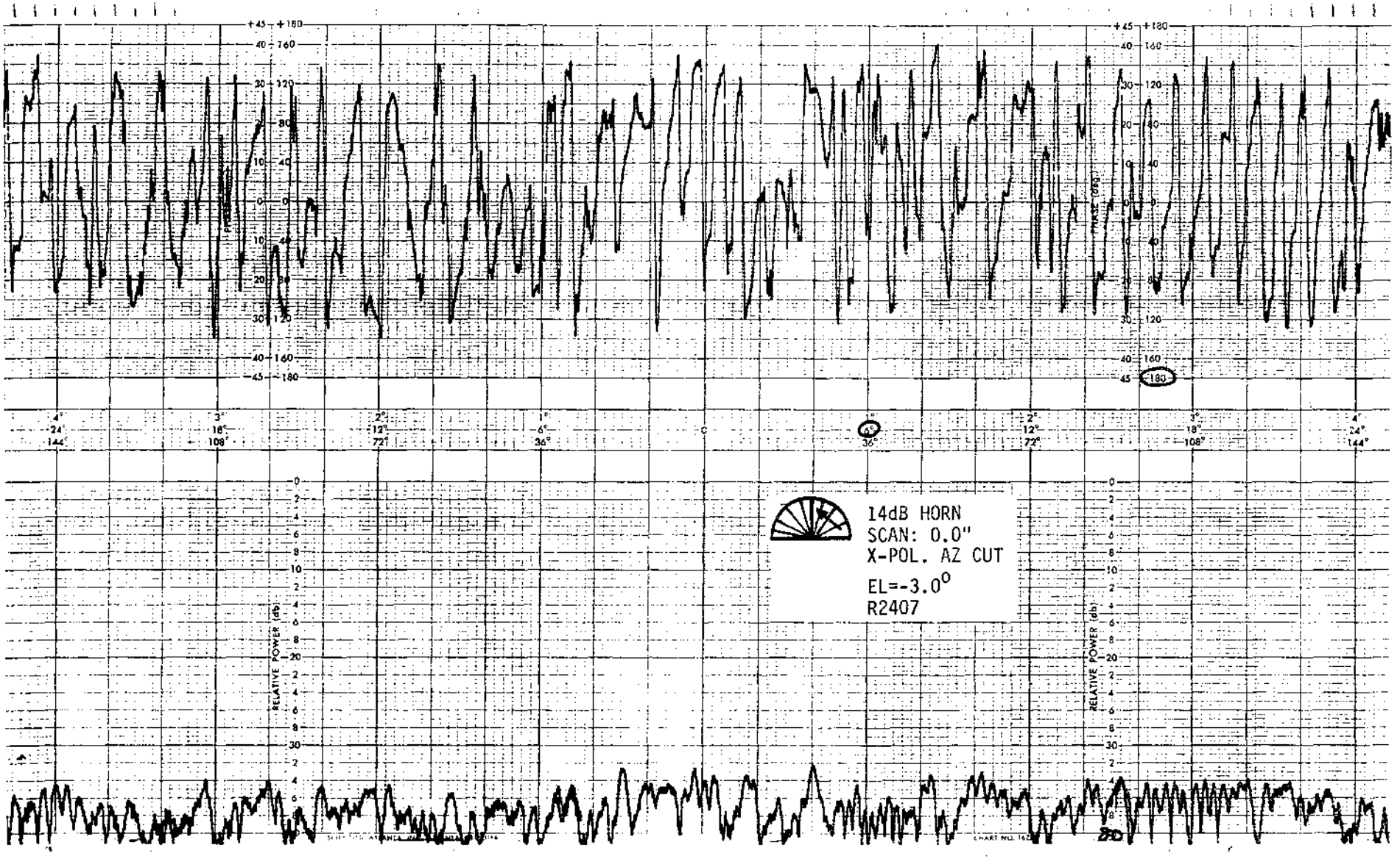
SCAN: 0.0"
X-POL. AZ CUT
EL=+1.0°
R2403
PHASE (deg)
RELATIVE POWER (db)


14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=0.0°
R2404
RELATIVE POWER (db)
PHASE (deg)


14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=-1.0°
R2405
PHASE (deg)
RELATIVE POWER (db)


14dB HORN
SCAN: 0.0°
X-POL. AZ CUT
EL=-2.0°
R2406
PHASE deg
RELATIVE POWER (db)


14dB HORN
SCAN: 0.0"
X-POL. AZ CUT
EL=-3.0°
R2407
PHASE (deg)
RELATIVE POWER (db)

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA CR-172412		

4. Title and Subtitle	5. Report Date
Hoop/Column Antenna - RF Verification Model Volume I - Test Results	August 1984
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
W. F. Croswell (Editor), M. D. Vanstrum, R. J. Schrimpf, R. G. Taylor, and R. L. Moye	
	10. Work Unit No.

9. Performing Organization Name and Address	11. Contract or Grant No.
Harris Corporation Government Electronic Systems Division P. O. Box 9400 Melbourne, FL 32902	NAS 1-15763
	13. Type of Report and Period Covered
12. Sponsoring Agency Name and Address	Contractor Report Jan. to Aug. 1983
National Aeronautics and Space Administration Washington, DC 20546	14. Sponsoring Agency Code
	506-62-43-01

15. Supplementary Notes

Langley Technical Monitor: Thomas G. Campbell
Final Report

16. Abstract

As part of the Large Space System Technology Program, this report, in two volumes, presents the theoretical and experimental results of the RF characteristic of a hoop/column, quad aperture antenna using an RF verification model.

To satisfy the primary purposes of the model it provides experimental pattern data for the quad aperture configuration at different reflector edge illumination levels, from which the geometry and edge effects can be assessed, and provides experimental data which can be compared with calculations using various theoretical reflector scattering formulae. It also experimentally determines the effects upon secondary patterns of scale model quartz cables, as used in the hoop/column design, upon secondary patterns in order to assess the importance of developing a scattering theory to predict such effects. In addition, this report contains a comprehensive theoretical study and the experimental pattern results of quad aperture antenna feeds, a discussion of the fundamental affect of parasitic side lobes, their amplitude, and location in space.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Antenna Parabolic Reflector Quad Aperture Hoop/Column Feeds	Unclassified - Unlimited Subject Category 32

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	322	A14

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